
MAP
OF THE
ISLAND OF JAVA
to Illustrate the Researches
OF THOMAS HORSFIELD, M.D.
Respectfully dedicated to the
HONOURABLE COURT OF DIRECTORS
OF THE
EAST INDIA COMPANY
By their grateful and obedient Servant
Thomas Horsfield.
The red line indicates the routes of Dr Horsfield.
SUMATRA
STRAIT OF SUNDA
BANTAM
BATAVIA
BUITENZORG
KRAWANG
INDRAMAYU
PRIANGAN REGENCIES
CHERIBON
TEGAL
PAKALONGAN
SAMARANG
JAPARA
REMBANG
MADURA
MADURA STRAIT
SURABAYA
BESUKI
BALY ISLAND
BALY STRAIT
Crimon Java Islands
110° Longitude East from Greenwich

LONDON:
PRINTED BY RICHARD TAYLOR,
RED LION COURT, FLEET STREET.

PLANTÆ JAVANICÆ RARIORES,

DESCRIPTÆ ICONIBUSQUE ILLUSTRATÆ,

QUAS IN INSULA JAVA, ANNIS 1802—1818, LEGIT ET INVESTIGAVIT

THOMAS HORSFIELD, M.D.

E SICCIS

DESCRIPTIONES ET CHARACTERES PLURIMARUM ELABORAVIT

IOANNES J. BENNETT;

OBSERVATIONES STRUCTURAM ET AFFINITATES PRÆSERTIM RESPICIENTES PASSIM ADJECIT

ROBERTUS BROWN.

LONDINI:

VENEUNT APUD GUL. H. ALLEN, ET SOCIOS, IN VIA LEADENHALL STREET DICTA.

LIPSIÆ: APUD BLACK, ARMSTRONG, ET SOCIOS. LUGDUNI BATAVORUM:

APUD S. ET I. LUCHTMANS. PARISIIS: APUD J. B. BAILLIERE.

MDCCCXXXVIII.

PRINTED BY RICHARD AND JOHN E. TAYLOR,

RED LION COURT, FLEET STREET.

TO THE

HONOURABLE THE COURT OF DIRECTORS

OF THE

EAST INDIA COMPANY,

THIS WORK,

WHICH THEIR LIBERAL ENCOURAGEMENT ENABLED HIM TO UNDERTAKE,

AND FINALLY TO PUBLISH,

IS RESPECTFULLY DEDICATED

BY THEIR GRATEFUL AND OBEDIENT SERVANT,

THOMAS HORSFIELD.

GEOGRAPHICAL PREFACE.

THE design of the Map which accompanies this Work is to indicate the principal localities visited during my researches, and to exhibit, so far as can be accomplished on a plane surface, the general physiognomy of Java.

The geographical situation and the external configuration are copied from a marine chart lately edited at the Hydrographer's department of Her Majesty's Admiralty, from an original Survey, made on behalf of the Netherlands Government in the Indian Archipelago, with the following title :—"Java Island from the Surveys of Baron Melvill de Carnbee, and other officers of the Dutch Royal Navy." This Chart was published during the year 1851.

Besides the authority of the original Survey and the sanction of the Admiralty, its further recommendation is the form of its execution, which is peculiarly adapted to the "Plantæ Javanicæ Rariores."

A detailed geographical description of Java does not belong to my purpose; for this I may refer to the "History of Java," by Sir T. S. Raffles; to the "Coup-d'œil général sur les Possessions Néerlandaises dans l'Inde Archipélagique," by Mons. J. C. Temminck; and especially to a work now in progress of publication in Holland, entitled, "*Java, deszelfs gedaante, bekleeding en invendige structuur*," door Dr. F. Junghuhn.

Java is situated between 105° 12′ and 114° 40′ longitude east of Greenwich, and between latitude 5° 52′ and 8° 40′ south. Its direction is from west to east, with a slight deviation to the south.

The island naturally presents the following subdivisions :—

The *first* or western division, denominated Sunda, extends from Java Head to the eastern boundary of Cheribon: in this the vernacular language is the Sundanese.

The *second* or middle division extends from the eastern boundary of Cheribon to the longitude of Surabaya; it is the largest and most important, and is distinguished as Java, strictly so called. Here the Javanese language is spoken in its purity, and with the dialects of high and low peculiar to it.

The *third* division extends from the longitude of Surabaya to the eastern extremity at the Straits of Bali; it comprises the Island of Madura, and is called by the Dutch the "*Oost-hoek*" or East-end. The vernacular language is still the Javanese, but deteriorated by a mixture of the dialects of Madura and the eastern islands.

In the compilation of the accompanying Map, the chief object has been, as already stated, to indicate the localities which I visited during my journeys, where my Herbarium and the plants described in this work were collected. In laying down these in the middle and eastern divisions, I have depended chiefly on the observations made during my journeys through the eastern division in 1806 and 1807, through the southern parts of the Native Princes' territory in the years from 1808 to 1811, through the western division of this territory in 1814 (an account of which is contained in the eighth volume of the Transactions of the Batavian Society, &c.), and through the eastern division of the same territory in 1815.

During these journeys the situation of the principal volcanos was also determined according to the means in my power, and accurate profiles were taken of them from various points of view. I have also been able to correct my previous observations from the late maps and surveys published in Holland with the authority of Government or by private individuals.

To the map of Mons. C. W. M. Van de Velde* I am principally indebted for the present geographical divisions of the island: these have been considerably modified since the publication of Sir T. S. Raffles' History, and since my departure from Java in 1819.

The altitudes of the mountains are specified chiefly from the Second Profile, contained in Dr. F. Junghuhn's work above cited. Here, a section on the principle of Hypsographical representation exhibits all the volcanos of Java, in consecutive order, from Mount Payong in the farthest extremity of the west, to Mount Ijen, at the Straits of Bali, constructed according to an accurate scale of proportion of base and elevation.

It exhibits to view the relative distance and elevation of the mountains, their summits, whether single or consisting of several points, their covering and lateral appearance, the intervening ranges and their relative height, with many other interesting particulars, combining in one view a most comprehensive body of information. As a proof of extent of research, perseverance of labour, skill and ingenuity of construction, it is, in my opinion, unequalled by any similar representation of a volcanic range. This work is the

* *Kaart van het Eiland Java te zamengesteld uit officiele bronnen door* C. W. M. Van de Velde, *Luitenant ter zee*, 1845.

result of many years' research in Java, during which every individual of the series of volcanos, forty-six in number, with a single exception, was ascended, examined, described and illustrated by many local maps, diagrams, views of craters and profiles.

One of the objects of the map which accompanies this work is to exhibit a view of the series of volcanos which passes through the island from east to west, varying in elevation from 4000 to nearly 12,000 feet above the level of the ocean. It consists of individuals connected by low ranges, forming aggregately a consecutive series, single in some localities, and double in others; interrupted in some points by the position of several individuals of the series which cross the island from north to south.

The form of the individuals is conical; either regular with a small base and attenuated top, or spreading out below, with several terminal points of unequal elevation.

The nucleus of the longitudinal range is trachyte, and the general uniformity of the several individuals exhibits the appearance that the whole range has been elevated nearly simultaneously, although the subterranean forces have been more violent in particular localities. It is, however, only a part of a chain of volcanic vents which pervades a large number of the Asiatic islands.

This chain has an irregular semicircular form, and commences at the northern extremity of Luzon, one of the Philippine Islands, near 19° of northern latitude; it then stretches south, with a slight eastward tendency, to the longitude of the Sunda Islands; then branches off suddenly in a straight direction from east to west, passing through the Islands Floris, Sumbawa, Lombok, Bali and Java to the western extremity of that island, when it takes a course north-west, through Sumatra to Barren Island near the eastern shore of the Bay of Bengal. The equinoctial line passes through the middle of this band.

Geologists are indebted to Sir Charles Lyell for having given, on the first plate of vol. i. of his "Principles of Geology," Ed. 1, a diagram of this volcanic band of the Molucca and Sunda Islands, with a reference to Von Buch's description of the Canary Islands, from which it is copied*.

The separate mountains, besides their conical form, are penetrated in most cases by a central tube or chimney, terminating above in an outlet or crater. These craters are in some cases of great extent, and their walls or sides illustrate the original constitution and structure of the volcanos. They expose to view extensive strata of trachyte, either vertical and regularly columnar or disposed in oblique and horizontal strata.

---

* "Plate I. fig. 1—showing that a chain of volcanic vents surrounds the Asiatic Islands: in the same manner as a continuation of the same line skirts the eastern borders of the continent of Asia. This Plate is copied from Plate XIII. of Von Buch's *Phys. Besch. der Canarischen Inseln*, Berlin, 1825. The position, however, of some of the volcanos, and the outline of several of the islands, have been corrected."

Many of the individual volcanos have been quiescent for ages ; others afford evidence, by later eruptions of considerable violence, that the subterranean forces which elevated the entire series are still in active operation in some points.

In several the cones above are naked, or covered with lava thrown out by later eruptions; this is particularly the case in Mount Guntur* in the Priangan Regencies; but in most of the mountains the successive eruptions have covered the declivities with volcanic debris, arranged in successive strata, in which vegetation has been proceeding during many successive periods.

Almost every variety of volcanic products is found in Java. Sulphur is abundant in several craters ; lava of every possible variety is found, as well on many volcanos in the locality where it was thrown out, as abundantly diffused in distant parts; also scoriæ, volcanic debris, pumice, obsidian and tuff. Volcanic ashes in the highest state of comminution have been thrown out by many of the eruptions in recent periods.

Basalt is also abundant in many parts, independent of trachyte, either in separate fragments, largely diffused along the bases of the volcanos, and through the lower ranges, or in regular strata; the most remarkable of these is exposed in the district of Banyu-wangi, where a stratum of great extent, near the ocean, which consists of nearly regular laminæ or plates, has received the name of Batu-dodol, from its resemblance to a Javanese comfit of a tabular form.

Volcanic mud-wells are found in several parts of the island in tracts but little elevated above the level of the ocean. The largest and most important of these is situated in the district of Grobogan, near the village of Kuwu. The neighbouring territory is richly impregnated with salt; and large quantities of this article are prepared by the inhabitants of the neighbouring villages. (For a more detailed description of this volcanic phænomenon I refer the reader to Sir T. S. Raffles' History of Java, vol. i. pp. 23 and 24.) Another mud-well of smaller dimensions is found in the province of Surabaya, at the village Buntidan, near the sea-shore.

Hot-wells are common near the declivities of the volcanos; several of these are strongly impregnated with carbonic acid gas. (See Raffles' Hist. of Java, vol. i. p. 23.)

Lakes of great extent do not exist in the island, but several very beautiful collections of water are found in various localities; among which is a small mountain-lake on the hill Ngebel, a declivity of Mount Wilis, and the Blue-water near Passuruan. Marshes of considerable extent are accumulated during the rainy period in many places; they are called Rawas by the natives: the chief are the Rawa of Demak near the Prowoto hills, and the Rawa Tona in the district of Aya in the province of Banyumas.

---

* See remarks on this mountain in Trans. Batav. Soc. vol. viii. pp. 159—163. Second Edition.

The principal rivers on the north coast of the western division are the Tji (or river) Kandi, Tji-sendani, Tji-liwung, Tji-tarrum and Tji-manok: on the south coast, Tji-kaso, Tji-jambong and Tji-wulan.

In the middle division the north coast is supplied with numerous streams descending from the mountain range, and irrigating the extensive alluvial plains: on the south coast the river Serayu and the river Progo, with its branch the Ello, are the most considerable. In the eastern part of this division the two largest rivers of the island are found; the first of these is the river of Solo, rising in the extended ranges along the south coast, which after passing the capital of Surokerto, winds slowly through the districts of Socowati, Jogorogo, Rembang and Sidayu, and falls into the ocean near Grisek*: the next to this in size is the river Brantas, which having its source in the district of Malang, flows in a western direction, between the Mountain Klute and the southern range of hills, to the declivities of Mount Wilis, where it takes a northern direction through the plains of Kediri, at the northern extremity of which it branches off to the east, and in the province of Surabaya discharges itself into the ocean, by several distinct branches.

Among the rivers of the eastern division, which are numerous, but not of considerable size, the White River, named *Kali* (or river) *puti* (white), also *Sungi-pait* (or bitter river), and *Sungi-assem* (acid river), is the most remarkable: it rises from the crater of Mount Ijen, and after passing through several valleys of the higher ridges discharges itself into the ocean near Sumber-waru. It is strongly impregnated with the soluble contents of the lake in the crater.

Among the plains or level districts, the following are the most important:—The plain of Bandong in the Priangan Regencies, between the parallel mountain ranges of this part of the island; the plain of Surokerto between the Mountains Merapi and Lawu; the plain of Madiun between Mount Lawu and Mount Wilis; the plain of Kediri; the plain of Malang; the southern plain of Pugar; and the elevated plain of Bondowoso between Mounts Ee-yang and Raön.

The superficies of the island to the north of the volcanic ridge is in general low and alluvial, while in the south it consists of ranges, rarely exceeding 3000 feet above the level of the ocean, called "Kendengs" by the natives, stretching longitudinally or obliquely along the southern ocean. Their constitution is greatly diversified; they appear to be independent of the great volcanic series, and to have been formed by a distinct agency. They constitute secondary or neptunian ranges. In some cases they come into close contact with the volcanic mountains, and cover their bases. They

---

* See remarks on this river in Trans. Batav. Soc. vol. vii. Art. iv. Over de Rivier van Solo.

are not regularly stratified like the immediate declivities of the cones, although they contain volcanic materials of various kinds. Fragments of basalt are also copiously dispersed among them; also many varieties of the Quartz family, as agate, calcedony, flint, prase, &c., with masses of petrified wood.

Iron pyrites occurs abundantly in Pajittan, and in other districts along the southern coast.

Besides these secondary ranges, steep piles of trap bound the southern shore precipitously in many parts.

Calcareous ranges are found both north and south of the volcanic range.

Extensive strata of sandstone, called "Padas" by the natives, occur in the lower regions. The large rivers Solo and Kediri as they approach the ocean pass through beds of this substance.

Solitary fragments of granite have occasionally, but rarely, been found in the western parts of Bantam, where it is nearest to Sumatra; but as a general proposition it may be asserted that granite does not exist in Java.

GEOGRAPHICAL DIVISION OF JAVA AND LOCALITIES VISITED.

WESTERN DIVISION.

BANTAM.

Tji-kandi, Serang, Pandeglang, Mountain Karang (the summit), Kolelet.

BATAVIA.

Localities in the vicinity as marked on the Map and on the road to the interior.

BUITENZORG.

Jassinga, Champeya, Pondok-gede, Tji-Serrowa, Mount Gedē (the crater), Tjipanas.

PRIANGAN REGENCIES.

TJI-ANJUR and JAMPANG west.

Bayabang, Tji-anjur (the capital), Gek-bron, Suka-bumi, Tji-kombar, Geger-bitong, Tji-merang, Purabaya, Tji-juruk, Kadu-pandak, Pabuaran, Tji-haör, Leggok, Lengkong.

BANDONG and SUMEDANG.

Radja-mandala, Ujung-brung, Bandong (the capital), Tji-ratton, Mount Tankuban-prahu (the summit), Maja-laya, Trogon, Leles, Mount Guntur (the summit), Garut, Passangrahan, Sincaparna, hot-wells of the district Galunggung, Indian, Raja-polla, Sindang-barang, Sumedang (the capital).

Cheribon.

Karang-sambong, Telaga, Ragawajana, Cheribon (the capital), Tankil, Karang-tengu, Badulan, Junti, Indramayu, Losari.

MIDDLE DIVISION or JAVA strictly so called.

Northern Coast.

Brebes, Tegal, Pakalongan, Batang, Kendal, Samarang, Demak, Japara, Kudus, Jewana, Rembang, Lassem, Tuban, Sidayu.

Divisions and Localities South of Samarang.

Serondol, Ungarang, Merak-mati, Lo-pait, Salatiga, Tugu, Jandi, Ampel, Bojo-lali, Kupo, Kopeng, Sello, Mount Merapi (the summit).

Surokerto.

Kertosuro, Kleju, Surokerto (the capital), Gedangan, Suku, Mount Lawu, Gondo-suli, Pring-ombo, Keduwang, Utter, Duku, Kessine, Punung.

Pajittan.

Rodjo-winangon (the capital), Kerpon, Nyimbong, Nyoro, Lorok, Bay of Lorok, Kalak.

Pajang.

Pakis, Klaten, Brambanan, Pepedan, Masaran, Tekaran, Kedung-prahu, Hill Gambar, Caves of Wirok, Simo, Sawaän.

Djocdjokerto.

Djocdjokerto (the capital), Bangul, Brossot, Kretek, Manchingan, Megiri.

Western Division of the Native Princes' Territory.

Mataram.

Kadi-lango, Jonno, Gobbang.

Banyu-mas and Bagalen.

Wedi, Karang-bollong, Rogo-dono, Jati-negoro, Selondoko, Banyu-mas (the capital), Kali-wedi, Maös, Donan, Tji-latjap, Nuso-Kambangan (island), Jodjok, Suko-rojo, Purwo-kerto, Aji-barang, Karang-anjar, declivities of Mountain Slamat or Tegal, Purbolingo, Purwo-rejo, Gemuru, Kuto-waringin, Banjar, Pagger-pella, Karang-kobar, Kali-lunyar, Panusupan, Batur, Hill Pakerman, Hill Ptarangan, Kassirian, Sikonang, Kayu-rangkang, Blederan, Chepoko, Kali-bebber, Kerteg, Rejo, Jittis, Parakan.

Kedu.

Pakis-wirong, Sechang, Kemantran, Kali-lusi, Luwano, Karang-anyar, Magelan, Boro-budur, Semen, Melokko, Melati.

Socowati, Grobogan and Demak.

Kramat, Socowati, Maia, Lengkong, Majenang, Kuwu, Wirosari, Purwo-dadi, Taruman, Demak (the capital).

Eastern Division of the Native Princes' Territory

Principal Subdivisions.

Surokerto, Jogorogo, Charuban, Kediri, Blitar, Trengali, Pronorogo, Madium and Magetan.

Surokerto, Masaran, Seragen, Sambong, Kedung-banteng, Jogorogo, Ngali, Derro, Charuban, Tunglor, Melokko, Berbek, Pachi, Kediri (the capital), Cave of Selomangling, Prudung, Pappar, Tigo-wangi, Konto, Bantaran, Kasan-antang, Selo-kodok, Selo-kurang, Pagot, Srengat, Blitar, Legok, Penataran, Gebug-anging, Binchi, Saventar, Selo-gurit, Kedung-bundar, Klampok, Keppok, Ngekul, Dogong, Wedusan, Genengan, Laär-gedog, Pandan-toya, Mountain Kloote (the summit), Ujong, Rowo, Kalangbret, Pakis, Kampak, Prigi, Bay of Segoro-wedi, Trengali, Sawu, Tegal-sari, Pronorogo, Kunti, Ngebel, Deloppo, Madium, Wono-rejo, Mahos-pati, Magetan, Sarangan, Karang-rejo, Brubu, Gamping, Trenguli, Suku, Surokerto.

EASTERN DIVISION or "OOST-HOEK."

Principal Subdivisions.

Grissē or Grisek, Surabaya, Bangil, Passuruan, Malang, Probolingo, Lamadjang, Pugar, Besuki, and Banyu-wangi.

Grissē, Surabaya, Kedung, Buntidan (mud-wells), Sidokari, Bangil, Porong, Singosari, Malang, Passuruan, Klo-ran, Puspo, Seding, Tossari, Mountain Tengger, Dasar (the summit), Probolingo, Bessu, Jabon, Bedulan, Joso, Klakka, Grobogan, Bendojudo, Lamadjang (the capital), Srebet, Besuk, Pulu, Ketting, Pugar (the capital), Sabrang, Sadeng, Balung, Gomelar, Rambi, Jember, Bondo-woso, Prajegan, Panarukan, Situ-banda, Sumber-waru, Bajul-matti, Batu-dodol, Banyu-wangi (the capital), Kadayunan, Machang-puti, Banyu-alit, Welahan, Popongan, Benelan, Lingo-joyo, Lemabang, Kutto-Blambangan, Gladag, Gintungan.

Island Madura.

Tanjangan, Bankalang, Aris-baya, Tana-mera, Belug

PROSPECTUS

By Dr. HORSFIELD.

In this Work, which is now submitted to the notice of the Public, it is proposed to give Descriptions and Figures of the more remarkable new or imperfectly known Plants, contained in an Herbarium of Two Thousand Species, collected by Dr. Horsfield, and placed by him in the Museum of the Honourable East India Company.

A residence of more than sixteen years in Java, and occasional visits to the neighbouring Islands of the Indian Archipelago, enabled Dr. Horsfield to bring together a considerable number of objects of Natural History, and likewise to collect a body of miscellaneous information regarding the Productions and Inhabitants of those regions. Although his opportunities of research were favourable, he was in a great measure destitute of the means of determining with precision the names and characters of the subjects collected, which were therefore brought to England in an imperfectly arranged state. The specimens composing his Herbarium were carefully disposed and numbered as they were successively collected in his travels, chiefly with the view to preserve an accurate record of their localities, of their respective elevation above the level of the ocean, of the soil in which they grow, and of such other particulars as were considered requisite for giving a general view of the geographical distribution of the Plants of Java.

On Dr. Horsfield's arrival in England the Zoological Collections required his first attention, both with a view to their preservation, and to their exhibition in the Honourable Company's Museum. It was therefore no less advantageous to himself than important to science, that Robert Brown, Esq., with a ready and disinterested zeal, undertook the examination and arrangement of his Herbarium. After much time and labour, every specimen of an extensive series of duplicates was examined, all the species of each genus were brought together, the entire Herbarium was distributed into families according to the natural method, and the basis of an

accurate catalogue was formed. By this operation, the number of species composing the Herbarium, which had previously been vaguely estimated, was determined to be 2196.

While engaged in this arrangement Mr. Brown noted in each family those subjects which appeared to possess the greatest interest, either on account of their novelty, or of their peculiarity of structure; and from the subjects thus noted he finally made a selection, which it was proposed to publish under the title of "*Plantæ Javanicæ Rariores.*"

It was at the same time determined that a series of figures for the illustration of all the subjects to be described in the work should be prepared. Although a considerable number of drawings had been made in Java by native artists, these were found useful only in the representation of the general character and habit of the subjects. Mr. Brown therefore undertook the task of preparing such dissections as were necessary for the illustration of the generic characters, or other interesting points of structure, and of generally superintending the execution of the drawings: to this portion of the work Mr. Brown cheerfully devoted particular care and attention, and his experience in analysis of vegetable structure will be duly appreciated by Botanists.

After the completion of the drawings and of the illustrative details, the subjects were put into the hands of the engraver, and Mr. Brown commenced the preparation of the text. In the prosecution of this task his public engagements, and other important scientific inquiries accumulating in a degree beyond what was expected when he commenced the work, it was agreed between Mr. Brown and Dr. Horsfield that the original plan should be modified, and that the assistance of a coadjutor should be obtained.

On this point Dr. Horsfield has the satisfaction to state that J. J. Bennett, Esq., Mr. Brown's assistant in the Botanical Department of the British Museum, was found willing to prepare for the press such articles as were left unfinished by Mr. Brown, and likewise to cooperate generally in the preparation of the work. In accordance with this plan the title has been modified; and Dr. Horsfield has the pleasing duty, in this place, to acknowledge the ability and assiduity with which Mr. Bennett has performed the task he has undertaken. The minuteness of detail and extent of research with which he has elaborated the articles he has contributed, elucidate clearly and satisfactorily the characters and habits of the subjects, as well as the history of their discovery, and the labours bestowed on their investigation by

preceding Botanists. Mr. Brown has, agreeably to his original intention, contributed his remarks on the affinity and structure of the subjects described; he has also afforded many valuable suggestions in the progress of the work, and the whole has received his examination and revisal.

Dr. Horsfield embraces with pleasure and satisfaction the opportunity now afforded him of publicly expressing his great obligations to Mr. Brown. The examination and arrangement of his Herbarium, the laborious duties connected with the superintendence of the figures contained in this work, the preparation of the illustrative details, and the time devoted to the description of the subjects, are by no means the only marks of friendship which he has received from that distinguished Botanist; who ever since his arrival in England has afforded him his advice and assistance in his researches connected with Natural History, and on many other important occasions.

Dr. Horsfield commenced his researches in the year 1802, under the auspices of the Dutch Colonial Government, by an inquiry into the Plants employed by the natives in the cure of diseases. This inquiry naturally directed his attention to the Vegetable Kingdom at large; and being desirous with this view to take a general survey of Java, he first examined the Regencies situated south of Batavia, then traversed the provinces along the northern coast, and subsequently the eastern extremity of the island. Although during these various journeys, to which several years were devoted, Materia Medica and Botany formed the principal objects of his researches; he likewise gave occasional attention to the Zoology and Geology of the districts through which he passed. Having terminated his inquiries in the northern and eastern provinces, he proceeded in the year 1809, from Samarang southward to the interior of the island, with a view to examine the territories of the Native Princes.

Soon after this period the Island of Java became, by right of conquest, a possession of the Honourable East India Company, and the results of Dr. Horsfield's researches were in consequence, in the year 1811, transferred to the new Government. The energetic patronage he now received enabled him to take a wider range; and he was induced to extend his inquiries more particularly to the other departments of Natural History, and also to the domestic œconomy, agriculture, and government of the inhabitants of those regions.

In the prosecution of these various objects Dr. Horsfield made many excursions through Java: in the year 1812 he was sent to Banca by the Colonial Government,

with instructions to examine and report on the condition of the tin mines, and the details connected with their history and administration; and he was at the same time encouraged to extend his researches to other objects of general interest. Nearly a year was devoted to this mission, during which most of the mining stations were examined, and a collection of plants was also made. In the year 1818 he visited Bencoolen and Padang, on the west coast of Sumatra; and in a journey to the Menangkabo district, situated east of Padang, he was enabled to collect some of the Botanical and Zoological productions of Sumatra. In the early months of 1819, two years after the restoration of Java to the Netherlands Government, he proceeded to England to communicate the results of his researches to the public.

In his endeavours to accomplish this object he has invariably enjoyed the most liberal countenance and support of the Honourable Court of Directors of the East India Company. During his early employments in arranging his Zoological Collections in the Museum at the India House, to which reference has already been made, he had likewise favourable opportunities to prepare for publication a selection of the more interesting Mammalia and Birds which he brought to England, and to compile catalogues of his collections, which have in part been submitted to the public.

With the liberal patronage which has in later years been extended, under the sanction of the Company's Government, to the cultivation of Astronomy, Geography, and to the Statistical Survey of many parts of India, Natural History has also received a considerable share of attention; and Collections have been received from Siam, from Cochin China, from Sumatra, from Madras, from Bombay, and from various other parts of the Company's territories: the charge of the arrangement and preservation of these was likewise committed to Dr. Horsfield, and he was enabled, as heretofore, to combine with the duties required of him in the Museum, the prosecution of his original design with his own materials. Another descriptive work therefore has been undertaken; and although the difficulties connected with publications on Natural History have occasioned more delay than he had anticipated, he has now the prospect of fulfilling his engagements with the public.

April 2, 1838.

POSTSCRIPT.

THE Plantæ Javanicæ Rariores having been brought to a conclusion by the disinterested and invaluable labours of Robert Brown, Esq., and John Joseph Bennett, Esq., it remains for the Collector to add a few explanatory remarks on the origin and history of the Work.

In the Prospectus its object is stated to be: "*to give Descriptions and Figures of the more remarkable new or imperfectly known Plants contained in an Herbarium of two thousand species collected by Dr. Horsfield, and placed by him in the Museum of the East India Company.*" Most of these are natives of the Island of Java; a smaller number was collected in Banka and in Sumatra.

I have in the first place briefly to detail the circumstances which led to my researches in Java, and to the formation of this Herbarium.

As early as the year 1800, a voyage to Batavia, as surgeon of a vessel from Philadelphia, gave me an opportunity to observe something of the character of the Island of Java. I was delighted with the beauty of its scenery, the grandeur and abundance of its vegetation, and the richness of its productions in every department of Natural History, and a desire arose in my mind to become better acquainted with it.

On the termination of the voyage I resolved to return to Batavia, and to attempt a scientific examination of the island. I procured such works on Natural History as were at that period obtainable in Philadelphia, a few instruments, and the most necessary materials for collecting and preserving subjects of Natural History, and in the course of the following year I undertook a second voyage to Batavia.

The design I had in view required the sanction and support of the Colonial Government; to obtain these I resolved to enter its service, and, on an application in the usual form, I was appointed to the office of a surgeon in the Colonial Army. I was now permitted to visit the interior, and to examine the natural productions of the Island.

I commenced my researches in the districts of Buitenzorg and Tji-anjur, situated to the south of Batavia. I was instructed by the Government to direct my attention in the first place to the useful products of the vegetable kingdom, and especially to the substances used by the natives in the cure of diseases. During the space of about one year I made many excursions through the districts above-mentioned, and also visited the southern coast of the Island, after which I returned to Batavia, and laid a Report of my observations on the medicinal plants used by the natives, and a list of the plants observed, before the Government.

This Report was submitted to the Council of the Batavian Society of Arts and Sciences, and through the recommendation of that body I received a more extensive appointment which afforded me an opportunity to extend my researches not only to the Vegetable Kingdom generally, but also to Zoology and Geology, although the Materia Medica of Java was at this time still the chief object of my attention.

For several years my researches were confined to the neighbourhood of Batavia and the Priangan Regencies generally as far as the boundary of the province of Cheribon. During my abode on the plain of Bandong, occupying the middle of these Regencies, at an elevation of about 2000 feet above the ocean, I had an excellent opportunity of observing the character of the ranges of the volcanic mountains in this part of the island.

Near the longitude of Batavia, the volcanic peaks, first of the Mountain Salak, and a few miles further east of the Mountain Gedē, occupy a situation in the middle of the island, at an equal distance from north to south: after an interval of about thirty miles, which is occupied by low ranges, the volcanic series reappears in two independent branches, bounding the interior plain above-mentioned. These two branches stretch in an oblique direction from west to east, in an irregular series.

The northern branch consists of the Mountains Burangrang, Tankuban-prahu, Bukit-tungul, Mangliang, Bukit-charian and Sumbilan; the southern of the Mountains Batuha, Tilu, Malawar, Sumbong, Wyahan, Papandayang and Tji-korai; while at the eastern extremity of this double range of mountains, several separate volcanos again occupy a situation near the middle of the island, namely the Mount Guntur about ten miles farther east, the Mount Talagabodas north-east of the Mount Papandayang and near to it the Mount Galung-gung. The volcanic series is then continued near the northern coast by the Mountains Tampomas and Chermai or Cheribon.

Two of these mountains, the Tankuban-prahu and the Mount Guntur, were examined with as much care and minuteness as my time admitted: for the details I refer to the eighth volume of the Transactions of the Batavian Society, Second Edition, 1826, p. 143, &c., Essay on the Mineralogy (or Geology) of Java*.

In the early part of the year 1804, I obtained the sanction of the Government to extend my researches to the eastern parts of the island. I commenced my journey at Cheribon, and proceeded along the northern coast through the districts of Tegal and Pakalongan to Samarang. The principal volcanic mountains observed on this road are the Mount Slamat to the south of Tegal, and the Mountains Sundoro, Sumbing, with the anterior ridges of Dieng and Prahu, situated south-east of Pakalongan.

At Samarang I obtained the assistance of a draughtsman, and various necessary materials for my object, when I passed in a southern direction through the territories of the Dutch Government to those of the Native Princes, and on my route examined three of the principal volcanos, which in the middle of the island (reckoning from west to east) form a transverse interrupted range, namely the Mountains Ungarang, Merbabu and Merapi. The latter, from which there have been several recent eruptions, I examined with more particular attention. In an ascent I noticed and described the condition of its crater in 1804. I had subsequently several occasions to notice its appearance in 1812 and 1817.

At Sello, a village on the declivities of the Merapi, I collected many of the plants which are peculiar to the higher localities of the island.

Hence I proceeded to the Western Capital of the Native Princes—Djocdjokerto—noticing in my road the antiquities of Brambanan, one of the chief remains of the ancient population.

In one of my excursions I visited the southern coast of Java, in this longitude.

From Surokerto, the eastern capital of the territory of the Native Princes, I made various excursions through the neighbourhood, the chief of which were a visit to the village Gandasuli on the declivities of Mount Lawu,

* In the paper referred to, it was my object to give a general, though necessarily imperfect enumeration of the series of volcanos, extending from west to east, through the whole island. At the same time I had compiled hastily a geological sketch, which was not sufficiently correct for publication. It may therefore be useful on this occasion to explain several mistakes and omissions which have been noticed, especially in the eastern division: namely the name of the Mountain Raōn has been omitted, and the name of Mount Ijen has been incorrectly engraved Tashem. As the western volcanic peaks have already been enumerated, I shall here limit myself to those eastward of the longitude of Surokerto: see Essay, p. 146 to p. 148. Mount Japara (northward of the general series), Lawu, Wilis, Klute, Kawi, Rejuno (Arjuno), Someero, Teng-ger (and Dasar), Lamongan, Ee-yang, Ringgit, Rowng (correctly Raōn), Ijen, Talaga-wurung or Balurang.

about 5000 feet above the ocean, and then to the Mud-wells of Kuwu, in the large central plain of this part of tl island. From Surokerto I passed down the river of Solo, the largest in the island, flowing in an east-north-ea direction to Grisek, on the northern coast, and subsequently to Surabaya, the capital of the eastern division—tl "Oost-hoek"—where I arrived towards the end of 1805.

Previous to the setting-in of the rainy season I proceeded to Passuruan, one of the provinces of the easter end of Java, under the administration of the Resident of Surabaya, to examine the Tengger Mountain, situate directly south of the capital, near the middle of the island.

This mountain constitutes one of the most remarkable volcanos of the island. It rises from a very large ba in a gentle slope, with gradually ascending ridges. The summit seen from a distance is less conical than most the other principal volcanos, varying in height at different points from 7000 to 8000 feet. The crater is not the summit, but more than 1000 feet below the highest point, and consists of a large excavation of an irregular circular form, surrounded on all sides by a range of hills of different elevation. It is by far the largest crater in tl island, and probably exceeds in size every other crater existing on the globe. It constitutes an immense gulf, tl bottom of which is level, and denominated by the natives the Dasar. It is naked and covered with sand througl out: in one portion, near the middle, the sand is loose and blown by the wind into slight ridges; to this the nativ give the name of Segoro-wedi, literally a sea of sand. The largest diameter of the entire crater is, according my estimate, full three miles. From the interior near the middle rise several conical peaks or distinct volcano The chief of these, the Mountain Bromo, is a perfectly regular cone, and still in partial activity with occasion eruptions. It is surrounded on one side by the sea of sand above-mentioned; adjoining to this stands anoth conical peak, more than 1000 feet high, named Watangan or Widodaren, covered externally with sand, quite nake and on account of its steepness, the top has never been examined. At a small distance from the Bromo rises smaller cone, called Butak: the two last have not exhibited any volcanic activity in recent times.

The Bromo, which rises from the middle of the Dasar as a regular cone, is also externally covered with san and is marked with regular parallel grooves and ridges: its height is above 600 feet. The ascent, though arduou is facilitated by steps which the natives have made in the sandy covering. On reaching the summit I was su prised by finding myself suddenly at the brink of an immense funnel, having a circumference of about one mil and a depth of more than 600 feet. Its form is on the whole regular; the internal walls are stratified with und lating strata of sand and volcanic debris of different colours, grey, reddish and black, from which project mass of trachytic lava. The sides converge to a small bottom, apparently about twenty yards in diameter, containi a greenish fluid, from which volumes of smoke ascend. While standing at the brink, several outbursts occurr which shook the mountain, and were accompanied by a rumbling noise resembling distant thunder.

The range of hills surrounding the Dasar is very steep and elevated on the north; at the opposite point it lower, and affords a passage for men and horses; and while I was occupied in examining the Bromo, my assistan amused themselves by galloping over the extensive sandy plain, 6000 feet above the ocean, much to the gratific tion of the attending natives.

The soil of the Tengger hills is extremely fertile, consisting of a deep vegetable mould, accumulated for ma ages on the sand and debris thrown up from the mountain. Vegetables of northern latitudes, potatoes, cabbage onions, &c., are planted by the natives in great abundance, for the supply of the markets of Passuruan a Surabaya. European fruits, as apples and peaches, are also raised, as well as wheat and other northern grain Rice refuses to grow, and the Cocoa-nut tree produces no fruit.

Most of the plants of the higher situations are also found, with several which appeared to be peculiar to th mountain.

The *Mydaus meliceps* of Fr. Cuv. is also an abundant inhabitant of the Tengger, and the "Posthouder" of t Resident of Passuruan gave me many details of the habits of this quadruped.

After the termination of the rainy season early in 1806, I left Surabaya for a general tour through the easte division of Java, the "Oost-hoek." Between Surabaya and Bangil I examined the Mud-wells at the village Bu

tidan near the seashore, and then proceeded by way of Passuruan to Probolingo, a province comprising some of the most extensive teak-forests found in Java. I visited parts of these forests in company with the superintendent, and also the ship-yard at Badulan near the shore, whither the timber is conveyed for use: on my route I observed an ancient pagoda, still in good preservation.

To this province belongs Lamadjang, a large interior district, about thirty miles south of the capital. On my way thither, the volcano Lamongan, situated near the middle of the island, was in a state of active eruption, discharging volumes of smoke and ashes during the day, and illuminating the neighbouring country by a bright column at night.

From Lamadjang, where I continued my researches for some weeks, I visited the confines of the Mount Someero and the southern coast, and then proceeded in a south-east direction through the extensive plain of this part of the island to the district of Pugar, about thirty miles farther eastward. The capital is situated near the ocean, at the eastern extremity of the southern plain, where a range of hills—Watangan—commences, which is continued near the south coast to the eastern extremity of the island.

The Ee-yang, a very extensive and complicated mountain, bounds the plain on the north: it continues the volcanic series from the foot of Mount Lamongan, although it has had no actual eruptions in later years.

From Pugar, I again took a northern course: to the village Jember the tract of country rises gradually over the eastern ranges of Mount Ee-yang. Near this village I noticed many of the inhabitants afflicted with the disease of goitre, although the air appears pure and the neighbourhood is very pleasant. Hence the road gradually ascends to the more hilly district of Bondowoso, and the principal village of the same name. Its elevation is about 800 feet above the sea, being bounded in the west by the descending ridges of the Mount Ee-yang, and in the east by those of the Mountain Raön. The latter exhibits at Bondowoso its true character; it consists of two principal points which stretch transversely across the island from north to south.

At Prajegan, the next considerable village, at the northern extremity of the district of Pugar, the road takes a more easterly direction.

Soon after leaving Prajegan the traveller finds himself in a region, the strictly volcanic character of which manifests itself by the traces of descending streams of lava, scantily covered with vegetable mould, and separated by deep ravines, affording a bed to the torrents descending from the neighbouring elevations; and also by a peculiar vibration of the ground, emitting to the tread of horses a dull hollow sound, which is easily recognized by persons who have passed the confines of Merapi, and of other mountains, near which the streams of lava are still naked.

Some miles north-east of Prajegan I obtained the first view of the Mountain Ringgit, formerly one of the most stupendous volcanos of the island, though at present in a state of entire quiescence. The history of the sudden disruption of this mountain in the year 1586, by which a large portion was suddenly ingulfed in the earth, is contained in the account of the voyage of Cornelis Houtman, who had under his command four vessels, with which he was on the eastern coast of Java, in the year 1597. Valentyn (*Oud en nieuw Oost Indien*, vol. iv. ch. 11. p. 77) gives the following authentic abstract of his relation:—"On the 18th of January, 1597, we saw in the morning the volcano of Panarukan, which in the year 1586 had its first eruption, and exploded with such violence that 10,000 persons lost their lives; besides this, no daylight was observable on account of the smoke for three days. Large stones were also thrown into the town of Panarukan."

At the time of the visit of the Dutch commander above-mentioned, ten years after the disruption, smoke of a dark colour was still emitted from the mountain.

At the present time the Mountain Ringgit exhibits no indication whatever of volcanic action: it descends in a gentle slope to the south, east and west, but the traces of its disruption appear in the north, where it presents a precipitous wall, on the top of which are observed several rudely projecting points.

In no part of the island, not excepting the Priangan Regencies, has the volcanic action been so general and so violent as in the eastern division. The evidence of this begins to appear in the Mountains Tengger and So-

meero; close to these follows the Mountain Lamongan, whose eruption in the year 1806 has already been mentioned; the Mountains Ee-yang and Raön, though quiescent at present, continue the volcanic series. Near the northern coast of the "Oost-hoek" we find the Mountain Ringgit, and at the farthest north-east point the Mountain Balurang or Talaga Wurung. On an eminence near the capital of Panarukan, eastward, I found a position which enabled me to take into one view most of the volcanic peaks which occupy the farthest eastern portion of the island. In a direction nearly south, the Mountain Raön with its anterior ridge, Bendil Raön, stretches across the island from north to south: about eight miles to the north-east of the Raön rises the mountain Kukusan, from the eastern foot of which a long range of low hills or Kendengs proceeds in a curve to the east: about eight miles south-east of the top of the Kukusan stands the Mountain Bendil Ijen, and ten miles further east, in the same latitude, the Mountain Rante; north of this, about five miles off, the Mountain Widodaren, the foot of which is connected with the Mountain Merapi or Mountain Ijen, strictly so called, which terminates the volcanic range in the east. From the eminence above-mentioned I took a profile of the entire range, from Raön to Ijen, as they appeared in the southern horizon.

From Panarukan I proceeded by way of Sumber-waru and Bajul-matti to Banyu-wangi, at the eastern extremity of Java opposite to the island of Bali, the present capital of a large eastern province, which formerly constituted the kingdom of Blambangan (or Balamboang by Valentyn), well-known in the ancient histories and maps of Java.

The province of Banyu-wangi is, to a naturalist, one of the most interesting and productive localities in the island. Excepting the immediate neighbourhood of the capital it is still covered with primæval forests, undisturbed by the hand of man. Its vegetable productions are rich and diversified, comprising most of those found in the western parts, with many that are peculiar to its eastern longitude near the islands of Bali, Lombok, Sumbava, and Floris.

For several months I traversed it in various directions. One of my objects was to become acquainted with the celebrated Upas or Poison-tree of Java, which was known by the researches of Mons. Leschenault de la Tour to exist in this province. The natives brought me to the largest tree growing near the village Kadayunan, about ten miles south of Banyu-wangi near the sea. The individual is of full size, nearly one hundred feet high, standing in a plain with several small trees near it.

An aged native prepared the upas in my presence. The sap of the tree was mixed with the roots of scitamineous plants and other condiments used by the natives, and its effects were immediately tested on a dog who was slightly wounded by an arrow thrown in the usual manner of the natives from a Sumpit, or blow-pipe, who died in about fifteen minutes.

It is remarkable that though trees of the *Antiaris toxicaria* are found in various parts of the "Oost-hoek," the natives of Banyu-wangi only are acquainted with the poison and the mode of preparing it.

A full account of the Javanese Upas, with some remarks on the *Strychnos Tieute*, Lesch., another vegetable poison of more active properties, will be found in Mr. Bennett's comprehensive article on the *Antiaris toxicaria*, pp. 52–63 of this work.

In another excursion I ascended the Mountain Merapi, which constitutes the eastern peak of the Ijen range, to its crater, situated on the western declivities between the highest peak and the Mount Widodaren. At the time of my visit, the bottom of the crater exhibited indications of the volcanic action going on in the interior of the mountain; several small pools were filled with a sulphureous fluid emitting fumes. According to the account of the natives, a violent eruption had occurred about thirty years ago, and one, less violent, about ten years since. Several eruptions have also taken place since my visit in 1806, as recorded in the Javanese newspapers.

From the margin of the crater of the Ijen I was enabled to ascertain in some measure the nature and extent of the volcanic forces in the eastern end of Java in former periods. Close in my rear was the summit of Mount Merapi; about five miles west rose the Mount Widodaren, and about ten miles, in the same direction, the Mount Kukusan; about six miles south of the Widodaren the Mount Rante, and ten miles westward the Mount Bendil Ijen. Nearly twenty miles west from the point on which I stood rose the Mount Raön; all these being com-

prised in an area about twenty-five miles across. The Mount Balurang, about sixteen miles north-east from the Mount Merapi, also belongs to this group. Their bases are united by intervening ranges or Kendengs, they have all a conical form, and exceed individually the height of 6000 feet.

From my position near the crater I also observed the Mount Ringgit near the northern shore; the Mount Ee-yang in the longitude of Besuki, the Lamongan south of Probolingo, and in the farthest western horizon, the Mountain Someero, with the Tengger stretching from south to north.

In the province of Banyu-wangi are also found many of the rarer mammalia, and among other species my collection was increased by the discovery of a genus to which the name of *Prionodon* was applied, the Delundung of the Javanese, of which a second species has been discovered by B. H. Hodgson, Esq., in Bengal, the *Prionodon pardicolor*.

After a day's inspection of the island of Bali, I returned along the northern coast of Java through the districts of Panarukan, Besuki and Probolingo to Passuruan, whence I visited the southern province of Malang. This province is celebrated on account of its richness in the remains of the ancient inhabitants: besides many inscriptions and solitary sculptures, it contains the pagoda of Singosari, one of the most perfect samples of Hindu buildings found on the island.

At Bangil, a station intermediate between Passuruan and Surabaya, I came into the vicinity of Mount Arjuno, with its anterior ridge Mount Penganggungan, and took an accurate profile of it. It occupies a station to the north of Mountain Klute, and belongs to the volcanic range. Its height, according to a trigonometrical measurement of Colonel Everest, is 10,500 feet above the ocean. The barometrical measures indicated on Mons. Van de Velde's Map of Java make it about 300 feet higher.

From Surabaya, after a short visit to the island of Madura, I returned along the northern coast, through the provinces of Grisek, Sidayu, Tuban, Rembang, Jewana and Japara to Samarang, where I arrived towards the end of 1807.

The condition of the northern coast of the island at this time did not permit me to proceed at once to Batavia with my collections, as I had originally intended. I therefore employed several months in the neighbourhood of Samarang; and during an excursion to the Prowoto Hills in Demak, and another to the Mountain Ungarang, I added considerably to my zoological and botanical collections.

I then undertook a second visit to the capital of Surokerto, where, with the consent of the government, I provided a temporary depôt for my collections, while I continued my researches in the neighbouring districts. I examined more especially the lower ranges of hills extending in a direction from west to east, along the southern coast. A visit to the Province and Bay of Pajittan was peculiarly interesting, both in regard of the vegetable and animal productions of the southern regions of the island. At Surokerto I also commenced my researches relating to the metamorphosis of Javanese Lepidoptera, for which the locality was peculiarly favourable.

While occupied in these pursuits, the island of Java became in the year 1811 a British possession, under the administration of the East India Company. At this time the result of my labours for nearly nine years consisted of collections in most departments of Natural History, with a considerable number of drawings, maps and descriptions, and I awaited with anxiety the result which the political events might have on the researches in which I had been engaged on account of the late government.

The first intimation on this subject was by a deputation to the capitals of the Emperor of Java at Surokerto and to the Sultan at Djocdjokerto, from the commander-in-chief at Samarang, to make the provisional arrangement required at this period, between the British Government and the Native Princes.

Major Robison, the Commissioner, on having examined my collections, ordered me provisionally to continue my labours until the determination of the higher authorities should be known.

My connexion with the former colonial government having terminated by the conquest of Java, it is my duty to make a public acknowledgement of the liberal countenance and support which I uniformly received during the prosecution of my researches. I also record with pleasure and gratitude the support and assistance afforded to me during my travels by all public officers, residents of districts, and by many private individuals.

The Honourable Thomas Stamford Raffles, Esq., subsequently Sir T. S. Raffles, having been appointed Lieut.-Governor of Java and its dependencies by Lord Minto, Governor-General of British India, directed his attention to the eastern provinces of the island, immediately after the completion of the necessary regulations at Batavia. In the month of November he reached Samarang, the capital of Eastern Java, and in the month of December he proceeded to the courts of the Emperor, or Susuhunan, and of the Sultan of Java. During his Excellency's visit to Surokerto he carefully examined the nature and extent of my researches and collections; he expressed his satisfaction with their results, directed me to continue them on behalf of the Honourable East India Company, and fixed the allowance for my services on the 21st of December 1811.

Before His Excellency's departure from Surokerto, I submitted to him a plan for devoting several months of the ensuing year to the more minute investigation of the Priangan Regencies, of which he approved.

The early part of the year 1812 I devoted to the preparation of several Essays from notes and materials collected during my travels.

In one of these I gave a concise account of the medicinal plants which I had observed in Java. The second forms the commencement of a series of projected essays on the Geology and Mineralogy of that island. In the third I detailed my experiments and observations on two native poisons, the Anchar and the Chettik, to which the name of Upas is indiscriminately applied. These essays were presented by Sir Stamford to the Batavian Society of Arts and Sciences, and have subsequently been published in the seventh and eighth volumes of their Transactions.

In the month of July, I submitted to Sir Stamford a proposal to prepare a collection of objects of Natural History, for despatch to the Museum of the Honourable East India Company. To this I received, through the secretary, the following reply:—"The Lieutenant-Governor highly approves of the proposal; he is convinced that it will be satisfactory to the Honourable Court to receive specimens of natural history of an island, respecting which so little is known in Europe; and he will have much pleasure in recommending to the favourable notice of the Court, the zeal, knowledge, and ability which have been displayed in your researches." . . . . . "I am desired to point out to you most particularly, that a description of the peculiarities and habits of such animals as are of new species will be almost necessary to complete the value of the collection." In the course of this year I likewise communicated to the Lieutenant-Governor some remarks on an entomological subject, which had been advantageously employed in medical practice as a substitute for the Spanish fly. To this I received an answer, through the secretary, stating that the Lieutenant-Governor had considered the discovery worthy of being made known to the public at large, through the medium of the Java Government Gazette.

In the month of September of the same year I obtained Sir Stamford's official sanction for undertaking the projected tour through the western districts of the island of Java, generally called the 'Priangan Regencies'. I arrived at Buitenzorg in the early part of October, during his absence, but was most hospitably received, agreeably to his instructions, at his residence. I followed him to Batavia, and at an early interview with His Excellency, he notified the intention of Government to despatch a commission to Banka, for the purpose of making an accurate inquiry into the affairs and resources of the island, and expressed his particular desire that I should be added to the projected commission. Although my favourite plan of traversing the fair Regencies of Western Java was, for the present at least, delayed by this appointment, yet I cheerfully acceded to his wish, and prepared my small establishment, consisting of a draughtsman, an assistant, and various native collectors, with the requisite materials, for an excursion to Palembang and Banka. The commission consisted of Colonel Eales the Resident, Lieutenant Hanson and myself. We left Batavia on the 1st of November. After a short visit to Fort Nugent on Banka, we proceeded to Palembang in order to obtain, at that Court, the information on which our future proceedings would essentially be founded. Our proposed visit having been notified to the Sultan, we were met at the mouth of the river of Palembang by an embassy from that prince, and magnificently conveyed in boats to the capital, situated about 120 miles from the coast. The facility and rapidity of conveyance were really surprising. The boats or canoes consist of excavated trunks of trees of great length: they are narrow, flat-bottomed, and rest lightly on the

surface. They are moved by natives sitting in alternate rows in the anterior part, who, by a regular impulse with their oars, cause the vessels to ascend the stream with a uniform but rapid motion. We were delighted and amused by the appearance of the capital. The houses rest on rafts of immense timber, floating in the stream, removable at the pleasure of the inhabitants, and skirting the sides of the river, for several miles, in successive rows. The palace alone and the European fort stand on solid ground. An impenetrable forest, rising from an extensive marsh, stretches along the banks for many miles, and there is no possible access to Palembang but by means of the river. The situation has been selected for the convenience of trade. Brigs of moderate size can approach the town; and the river commands the produce of an extensive portion of Southern Sumatra. The interior is fertile, and the supplies of the necessaries of life, as well as of various articles of traffic, are very considerable.

Having accomplished our object, and obtained the required details and documents regarding the former relation of Banka to the Princes of Palembang, we returned to Fort Nugent. Here our first duty was to afford all the assistance in our power to the relief of the garrison. The situation of Fort Nugent, although selected with every prospect of healthfulness, was on experience found to be the very reverse. It was dry and elevated, and to appearance, beyond the reach of marshy exhalations; but the nakedness and exposure of its site afforded no shelter from the violent gusts of wind, which were impregnated with the effluvia of distant marshes.

The military, removed hither on the formal cession of Banka to the British Government, had no other accommodation in the commencement than their tents, and soon became very sickly. A more salubrious and sheltered situation was selected, with the advice of the best-informed natives, a few miles to the east of Minto, the commercial capital of Banka. Here, at a small village named Rangam, a temporary hospital was established, which appeared to answer every expectation, and the invalids speedily recovered. At this place I likewise formed a temporary domicile, and enjoyed for several months uninterrupted health.

The Resident, however, being confined by official duties to Fort Nugent, soon became ill, and his return to Batavia was found advisable. Lieutenant Hanson also was seized with the prevailing fever, in consequence of excessive fatigue, and he likewise resolved to visit Batavia for the recovery of his health. At this period the medical duties of the garrison and hospital required my active attentions.

Under such circumstances little progress could be made in the objects of the commission. I had, however, the satisfaction to be informed by Major Robison, who succeeded Colonel Eales, in March, that my exertions met with the approbation of the Java Government. He likewise informed me, that it was left to my own determination to return to Batavia, or to prosecute those inquiries which were expected of me when I was appointed a member of the commission. I resolved without hesitation not to lose so favourable an opportunity to make a general survey of the island in a mineralogical point of view; and the prospect which I entertained of extending my researches to Zoology, and particularly to Botany, afforded a strong incitement to my resolution. I had already, with the assistance of the most intelligent natives residing at Minto, together with that supplied by occasional visitors from Palembang, formed a sketch of a route throughout the island, which would enable me to examine every valuable mine and establishment, exclusive of several of minor importance at the southern extremity. In the inquiries which I prosecuted as far as circumstances allowed during my residence at Rangam and Minto, I had obtained considerable information on the general state of the island, the administration of the mines, and the relations of the Chinese miners to the former government; these I communicated in the form of a short essay to Major Robison on his arrival.

I commenced my journey in March, and in June I completed the plan originally proposed. The information which I collected was submitted to Sir Stamford in the form of a Report on Banka. This is occasionally referred to in his correspondence, and he has likewise mentioned it in very favourable terms in his address to the Batavian Society of Arts and Sciences. In the month of August I returned to Batavia, where I prepared a concise abstract of the information, of a general political nature, obtained at Palembang and Banka, in conformity with the first part of the instructions imparted to the commission. The chief object of this was to place in a distinct point of

view the former connection of Banka with Palembang, and to illustrate the legitimate rights which the Sultan of Palembang possessed over Banka. Having completed these I proceeded to Buitenzorg, where I again met with a most cordial reception. The Lieutenant-Governor had now fully matured his plans of a general reform in the internal administration; and in many parts, his system of an improved land-revenue was already in operation. His Excellency was pleased to give me many circumstantial details on this subject in those interviews in which I personally related my proceedings in Banka.

After a short abode at Buitenzorg, I obtained Sir Stamford's consent to prosecute my journey to Surokerto.

In the month of September I safely reached my residence in Surokerto. At my departure I had made my arrangements for an absence of four months; I had in prospect a tour through the 'Priangan,' the most romantic and perhaps the most interesting portion of Java, where the natives are characterized by honesty and simplicity of manners, and by a distinguished attention to European travellers. Instead of this excursion, promising to my hopes much rational delight, I spent many months among rude and boisterous Chinese miners—among Malays, scarcely approaching a state of civilization, many of whom lead a roving life in forests, and among Rayads, or Ichthyophagi, who gain their subsistence on the ocean, form no fixed dwellings on land, but pass their life in their boats, feed almost exclusively on fish, and are emphatically designated in the Eastern world 'Orang lout,' men of the sea. Java is universally famed for its abundance in every necessary of life: in Banka the most common provisions can often scarcely be obtained for money. In Java the roads, in many parts, bear a resemblance to those in England: in Banka the traveller can in most cases advance with difficulty on foot, and his progress is frequently stopped by marshes and rivers. In addition to these, circumstances of a public nature afforded much uneasiness. The affairs of Palembang became again perplexed by the machinations of a fugitive prince. The garrison, intended to give countenance to the Honourable Company's establishment in Banka, was required at the capital of the new Sultan. When I returned to Rangam, I found our infant hospital, which I had left under favourable auspices, without an inhabitant. The only source of real consolation which had supported me under many privations was destroyed during the last days of my journey. I had been, upon the whole, successful in my geological and botanical researches. My herbarium was extensive, and many new and interesting plants had been hastily sketched, the completion of which promised to afford a delightful relaxation on my return to Rangam. The day before I intended to embark at Kotta-Waringin, the last post which remained for examination, my draughtsman was imprudently involved in an affray with the natives, and fell a victim to their ferocity. Many of my geological and botanical acquisitions were destroyed in the confusion caused by this unforeseen event, and I retreated to the boats, which fortunately had already been prepared for our conveyance, and after several anxious days returned to my deserted hamlet at Rangam.

After my return to Surokerto, I devoted several months to the preparation of a geographical and mineralogical description of Banka, from the documents and materials collected during my tour. I enlarged more particularly on those practical subjects to which the attention of the commission had been directed by Sir Stamford's instructions.

In the early part of 1814, we were honoured at the native courts by a second visit from the Lieutenant-Governor. Many very pleasing reflections are associated with this visit. Its tenor was very different from the former, which immediately followed the conquest of Java. In the government districts the improvements projected by Sir Stamford in the administration, were already established to a considerable extent. The commotions which had for many years distracted the neighbouring Court of Djocdjokerto had been set at rest. Peace, and a large share of prosperity prevailed generally throughout the island. The affairs of the capital likewise were in an organized state, allowing the temporary absence of the Lieutenant-Governor; Sir Stamford, therefore, had full opportunity to devote some days to a studious observation of the manners and peculiarities of the natives, in a place where they prevail in their purest state, and to those public attentions and festivities which the Princes are proud to exhibit when they are visited by persons of high political rank.

In the course of this visit I had an opportunity of submitting to the inspection of the Lieutenant-Governor, the

result of my excursion through Banka, which was now in an improved state of arrangement, and also the additions which had been made in Java in the interval since his former visit. A few days later I handed to him, at Samarang, a considerable portion of my general report on Banka, with the illustrations accompanying it: in all these I had the satisfaction to receive decided marks of his approbation.

Being desirous of resuming my researches in Java before the farther advancement of the dry season of 1814, I submitted to Sir Stamford, in June, the plan of a journey through the western portions of the territories of the native Princes. I accordingly left Surokerto on the 1st of August, and proceeded in a south-western course by way of Djocdjokerto to Kadilango on the southern coast of the island. Passing along this coast through the provinces of Mataram, Bagalen and Banyu-mas, I first visited the caverns of the promontory at Karang-bolong, in which the *Collocalia esculenta*, Linn. sp., forms the edible birds'-nests, which are so much prized by the Chinese. After a short visit to the capital of Banyu-mas, I again returned to southward the Bay of Tji-latjap, formed by the island of Nuso-Kambangan. To the careful examination of these southern districts and the neighbourhood of the capital I devoted several weeks, and subsequently took a northern course to the district of Aji-barang, situated on the declivities of the Mountain Chermai (or M. Tegal), one of the principal volcanos of the island. While employed in the capital of Banyu-mas in examining the collections made in the southern provinces, I received a communication from Sir Stamford which afforded me inexpressible delight, as it was the means of bringing my feeble efforts to the notice of Sir Joseph Banks, and of opening a correspondence, which had a considerable influence on my pursuits. Having given me various scientific details, he proceeds,—"I have received a letter from Sir Joseph Banks, of which I enclose you a copy, in the hope that you will be able to assist me in meeting his wishes;" accordingly on my return to Surokerto I prepared a series of botanical specimens for Sir Joseph, the catalogue of which was returned to me with Mr. R. Brown's elucidations and remarks, which in my distant situation were really invaluable.

I returned to Surokerto from the capital of Banyu-mas by an interior route, which, following the valley of the river Serayo in an eastern direction, led me, by way of the villages Purwo-rejo, Gomuru and Kuto-waringin to the district of Banjar, where the road suddenly branches off to the north, and gradually ascending the mountain ridges, passes over the villages Pager-pella, Karang-Kobar, Kalilunyar and Panusupan to Batur, which is situated near the south-western boundary of an extensive mountain-territory, consisting of several independent points, the chief of which are Mount Ptarangan, with its appendage Butak, Mounts Pakerman, Nogosari, Wismo and Paggertipis.

This mountain-territory, named Mountain Dieng, is one of the most singular and interesting localities of the whole island. It constitutes the western acclivity of a large mountain-chain, to the aggregate of which the name of Mountain Prahu is applied.

The Mountain Dieng is especially celebrated on account of the variously modified volcanic phænomena which it exhibits. Besides an extensive crater, it contains the lakes of Telogo-Jebong and Menjer, and several volcanic pools which are still in partial action and send forth sulphureous vapour; but the most remarkable point is the Mountain Pakerman, situated at the western extremity, which in the year 1786, after a violent eruption, followed by the sinking away of large tracts of land, excited consternation in the neighbouring districts, destroyed an entire village, and caused considerable loss of life: at the present time it discharges smoke from its crater. An authentic sketch of the appearance of this territory immediately after the disruption, was prepared by an officer of the marine establishment at Samarang, from which it appears that after continued earthquakes for several days, the catastrophe suddenly occurred with loud noises, and large tracts were swallowed up by the earth. Some details of the occurrence are contained in the note*.

* This neighbourhood was convulsed by the operation of a subterraneous combustion about the year 1786. After an earthquake which continued, at intervals, for the period of four months, an eruption forced its way not only through the existing volcanic apertures, above-mentioned, but through the neighbouring territory to the extent of two miles in diameter. Various

The Mountain Dieng is equally famous on account of its vegetable productions. The soil is extremely fertile, and besides the usual plants of elevated situations, several of the most valuable medicines used by the natives are found here. In the forests I discovered several birds new to my collections. The *Mydaus meliceps* is very abundant. From the Hindu remains found in various parts, the Dieng appears to have been a favourite locality with the ancient inhabitants. For further remarks on my journey to Banyu-mas I refer to the Essay on the Geography and on the territory of the Native Princes of Java, Trans. of the Batavian Society, &c., Second Edition, vol. viii. p. 141, &c.

In the descent from the Dieng I skirted the western declivities of the Mountains Sundoro and Sumbing, by way of the villages Sikonong, Kayu-rangkang, Blederan, Kalibeber and Kerteg, which is near the plains. Here the road takes an eastern direction to the village Kemantren, on the northern declivities of Mountain Merbabu, and a few miles farther east it joins the great road leading from Samarang to the capitals of the native Princes. I arrived at Surokerto on the 4th of November, 1814.

In the early part of 1815 Sir Stamford sent me the following communication:—"I was lately induced to ascend the Gunung-gedē (situated south of Batavia), which was accomplished with some difficulty; we found some parts extremely steep; at 12 o'clock (noon) the thermometer was at 55° (Fahrenheit), at six in the evening it fell to 47°, and soon to 46°, at which it continued until we retired to rest, about 9; at daylight in the morning, we found it at 45°; but the night was foggy and damp, and in clear weather, I have no doubt the thermometer is some degrees lower. We had a most extensive prospect from the summit:—Batavia roads on the north side, with the shipping so distinct, that we could distinguish a ship from a brig, and Winecoops Bay still more distinct on the other side: to the eastward we included Indramayu Point in the prospect, and Cheribon Mountain rose high above the rest."

In the month of May 1815, the Lieut.-Governor again visited the capital of Surokerto, when I had the satisfaction to perceive that his interest in my researches was undiminished; he received with attention my details, and examined carefully the collections, drawings, maps, &c., prepared since the period of his former visit.

I submitted to him the plan of an extensive journey, through the eastern provinces of the territory of the native Princes, and he fully approved of my design.

In accordance with this I commenced my journey soon after the Lieut.-Governor's departure: I proceeded in an eastern direction, and skirting the northern declivities of the Mountain Lawu, traversed the provinces of Sok-

---

rents were formed which emitted a sulphureous vapour, separate tracts sunk away and were swallowed up by the earth; into one of these the waters of the rivulet Dolog entered and afterwards followed a subterraneous course. The sulphureous vapours were observed in the atmosphere four successive days. The village of Jampang, at the confines of the convulsed tract, was likewise buried in the ground, and the inhabitants who had not timely left their dwellings perished: several persons were killed by the materials ejected from various openings. The aggregate number of persons who lost their lives on this occasion, most of whom were females, is estimated at thirty-eight. This information was communicated to me on the spot, by two of the principal Demangs (or chiefs of villages) of the Karang-kobar district, both natives of respectability, one of whom personally witnessed the event. At the present period the effects are nearly obliterated, the sides of the excavations being covered by a profuse vegetation. I noticed the remaining concavities, and visited that in which the rivulet Dolog sinks away. The water first accumulates in the remaining basin, which is about thirty feet broad, at the foot of a steep eminence, surrounded by large rocks of basalt, and then almost insensibly filtrates into the earth. During the rainy season, when the water is increased by a strong afflux from the hills, a portion still follows the original bed of the rivulet. On the site of the village Jampang I observed a moderate excavation; it is deserted, and the remaining inhabitants have fixed themselves at Kassiran, a village near the road leading from Batur towards Kadu.

Near the southern declivities of the Mountain Pakerman, the Mountain Nogosari is situated, stretching considerably to the south, and still further, in this direction, inclining gradually to the eastward, the Mountain Wismo. The extent and elevation of the latter is more considerable than that of the Pakerman, Nogosari, and the others of this range, all united at the base, and forming an assemblage, possessing separately almost the same degree of elevation. Their external appearance is likewise similar; they constitute somewhat extended ridges, and the sides are excavated by deep ravines.

kowati, Jogorogo, Madiun and Kediri; at the capital of the latter I remained some days to work up my drawings and to arrange my collections. I then went on to Srengat, an extensive and important district at the eastern confines of the Native Princes' dominions, and abounding in extensive and interesting remains of the former Hindu race of inhabitants.

The most important of these is the Pagoda or Jandi of Penataran, called Jandi-gambar by the natives, from the numerous sculptured figures with which it is ornamented.

From the capital of Srengat I visited the confines of the Mountain Klute, one of the volcanos of the island, celebrated by its numerous and violent eruptions during the last one hundred years. One of the most destructive of these occurred in the month of August 1785, the effects of which spread terror through the neighbouring districts, and attracted the notice of the government of Java. A deputation was sent to examine its nature and extent, and one of the results of this examination has been preserved in a sketch representing the Mountain Klute and its neighbour Mount Kodowesie as they appeared soon after the date above-mentioned. It is remarkable that this eruption occurred but a few months after that of the Mountain Pakerman, situated at a great distance westward in the province of Banyu-mas.

This disruption of Mountain Klute has been confounded by some writers with that of the Mountain Ringgit, above-mentioned, which occurred in the year 1586.

My first attempt to ascend the Mountain Klute from the south side was unsuccessful, and I returned to Srengat to pursue my route. Here my attention was attracted by several cases of goitre among the inhabitants, and in answer to my inquiries the natives informed me, that in the village Pandan-toyo, near the western side of the mountain, most of the inhabitants were affected with this disease. Being desirous to examine this statement in person, I proceeded thither, where an interview with one of the chiefs from the capital, the Radin Rongo, became the means of assuring me that the ascent of the Klute was practicable from this point. The Radin himself had visited the mountain and engaged to accompany me in the ascent.

The summit of the mountain is accessible only by a ravine which transmits a river flowing from the western confines of the crater; and the passage through this ravine was perhaps the most singular and extraordinary scene which I witnessed in the island. This river, or as it is named by the natives, Laär of Gedog, though a violent torrent in the rainy season, is nearly dry in the month of September. A gradual ascent over a sandy plain leads to its entrance, which is broad and slightly ascending. As the traveller proceeds he soon finds himself in a volcanic chasm, the sides or walls of which display before him the interior structure of the base of the mountain: they consist of horizontal strata of great length, composed of every variety of volcanic materials; lava of different sizes and shades of colour, blocks of trachyte, lapilli and volcanic detritus, and sand appearing to be calcined, very minute and of a brilliant white colour.

The general tendency of the Laär of Gedog is eastward towards the mountain, diversified however, by many curves. In the progress the walls become steeper, slightly inclining or perpendicular, rising in some points to the height of 100 to 120 feet. The chasm itself varies in breadth, in some places admitting a single person with difficulty, at others spreading to an extent of twenty or thirty feet; the bottom is strewed with blocks of lava, and the passage is extremely difficult. The materials and fragments composing the walls are in many places small and loosely disposed, and the least gust of wind precipitates them on the traveller. After a passage through this ravine of about seven hours, I reached a small plain near the confines of the summit, from which I proposed to ascend to the crater.

I was followed by a long train of natives provided with necessaries required to pass several nights near the mountain. As the day was far advanced, we prepared for a bivouac. A few simple huts were soon prepared by the natives, in which we passed the night under a serene sky. In the morning our first object was to discover the means of ascent; after various circuitous attempts we found a passage on the east side, which, though arduous and difficult, led us to the summit of the Mountain Klute.

This summit consists of the crater and an extensive sandy plain on the east of it, perfectly level, irregularly

oblong, extending several hundred feet in all directions, called by the natives the Allun Allun: it is bordered by nine steep points, rising irregularly and precipitately from the highest part of the mountain; the chief of which are called Jogo-glimbung, Kodo-wessi and Gaja-kombang, while several volcanic chasms, similar to the Laär of Gedog, are observed to descend from various parts of the summit.

The crater itself has the form of an irregular inverted cone or funnel, the sides of which descend nearly vertical or with a slight inclination to a lake of greenish water at the bottom, of nearly the same extent as the upper margin. The walls of the crater exhibit a very distinct representation of the internal structure of the mountain, the basis or nucleus of which consists of immense piles of trachyte, disposed either vertically, like many of the basaltic columns of the Giant's Causeway, or in strata horizontal or oblique, the component parts of which have a regular angular form. The intervals of these strata are filled up with fragments of lava, or with volcanic detritus of every variety.

As to the crater itself, nothing can exceed its sublimity, combined with a terrific rudeness, which is not equalled in any part of the island. Under these circumstances, the Allun Allun at the verge of the crater afforded us a safe retreat to make our observations with perfect calmness. My draughtsman prepared with ease sketches of the walls of the crater, in the west, the north and the south, while I was taking my notes and surveying the extensive prospect of the neighbouring districts. I estimate the circumference of the crater at between 1200 and 1500 yards, and its depth at about 300 yards.

On leaving the neighbourhood of the Mountain Klute, I passed through desolate tracts to the southern coast, then northward again to Pronorogo, and finally returned to the capital along the confines of Mountain Lawu, devoting a few days to the astonishing Hindu remains at Suku.

Not many weeks after my return to Surokerto on the 2nd of November, 1815, Sir Stamford was suddenly summoned to the eastward, in consequence of a conspiracy among the Sepoys serving in Java. As this conspiracy had originated at the native courts, he likewise proceeded to Surokerto, in order to regulate in person several important points on which the future tranquillity of the island materially depended. His visit was short and abrupt, and I mention it chiefly as a proof of the great activity and energy which characterized his public conduct. Of this mysterious event, the European inhabitants fortunately remained almost entirely unapprised, although their existence probably depended on the prompt decision of a moment, which under Providence was displayed by the British officers in the garrison of Djocdjokerto. And as Sir Stamford has himself mentioned this transaction in the History of Java, it may properly be stated, that the confidential friends of the Susuhunan of Surokerto, a prince who possessed many distinguished talents, and much amiableness of disposition, were peculiarly gratified by the promptness and mildness of Sir Stamford's conduct, which essentially contributed to save this prince from the ruin, which in all probability his weakness, in listening to the insinuations of the treacherous conspirators, would have otherwise entailed on him. On the occasion of this visit of His Excellency, I was enabled to make in person several preparatory dispositions towards a despatch of my collections to England, in the event of the transfer of this colony, which had already been intimated to me.

During the early months of 1816, I successfully pursued my research into the metamorphosis of Javanese Lepidoptera, and added largely to my former collections.

While thus employed, Sir Stamford communicated to me the changes which were to take place in the government of the island, and his determination to proceed to England before assuming the government of Fort Marlborough in Sumatra, to which he had been appointed.

Before he left the island in March 1816, a vessel from Holland with several officers and passengers brought the intelligence of the transfer of Java to its former rulers.

Meanwhile, by his kind exertions and recommendations, the countenance and support of his successor, the Honourable John Fendall, were fully secured to me, so that I was enabled to resume my inquiries without interruption.

I accordingly determined to employ the period that might still be allotted to me, as advantageously as possible.

Among other objects of examination, the Mountain Prahu appeared at this time the most important. My former visit had been very hasty, and had rather awakened than satisfied my attention in regard to its high interest, both in a geological and botanical point of view. As soon as my preparations were completed, I proceeded thither, and spent several days in those elevated regions, adding largely to my former observations and collections. I then took a southern direction, and after a short abode at Djocdjokerto, once more visited the sea-coast of the medial portion of Java. Soon after my return to the residency of Surokerto, the island of Java, and consequently the government establishments at the native courts, were restored to the Dutch: the British garrison took its final departure at a period much earlier than I had flattered myself would be the case; but by the friendly relations existing at this time between the two nations, by the liberal exertions in my behalf of the Honourable John Fendall, and by the active zeal of the Secretary, Mr. Assey, who was minutely acquainted with everything regarding my pursuits, I obtained, through an official communication, the assurance of the protection and support of the Netherlands Government, in the prosecution of my researches. I was, therefore, enabled to devote another year to the desirable object of bringing my labours to a satisfactory conclusion. The plan I accordingly formed embraced principally the following objects:—*First,* the examination of various localities in the territory of the native Princes, more particularly interesting in a botanical and geological point of view; *secondly,* the extension of my observations on the metamorphosis of Javanese Lepidopterous insects, and of the series of drawings in progress for their illustration; *thirdly,* the flora of the immediate neighbourhood of the capital of Surokerto, and the description of the agriculture of this district; *fourthly,* the completion of various miscellaneous notices of the native courts, the statistics of their territories, the manners and domestic arrangements of the Princes, their amusements, and public spectacles; *fifthly,* the working up of an extensive series of drawings in all departments of natural history, as well as of views, maps, and plans.

Accordingly I undertook another visit to the confines of the two principal volcanos of this part of the island, and examined in detail the summit of the Mountain Merapi. I then proceeded to the districts of Pajittan and Kalak, near the southern ocean, in order to examine the geological constitution of the ridges along the coast, and to devote the most productive season of the year to general entomology, and to the metamorphosis of Lepidoptera, in a tract abounding with a most luxuriant vegetation. After my return to the capital, early in the year 1817, I employed several months on the third and fourth points above enumerated, namely the peculiarities of the natives, and the flora and agriculture of the central districts.

I then secured my collections for a voyage to England, forwarded them to Samarang, and prepared for a final departure from my long and favourite place of sojourn. I concluded my investigations of the native Princes' territories by a visit to the antiquities of Boro-budur, in the Kedu, and to those of Brambanan and Jandi-sewu, in Mataram; thence proceeding in an easterly direction, I traversed the provinces of Sokkowati and Grobogan, surveyed once more the mud-fountains of Kuwu, and then directing my course westward through Damak, reached the capital of Samarang on the 1st of January, 1818.

In the early part of 1818, I proceeded towards the western extremity of Java. The intimation contained in Sir Stamford's letter, and the necessity of terminating my labours at the present juncture, concurred in directing me in this determination. Any opportunity of adding to my researches still afforded me, would be employed most advantageously in the Priangan Regencies. At Buitenzorg I received the liberal protection of the Dutch authorities, with many personal attentions most politely offered me by their Excellencies the Governor-General and the Commissioner M. Elhout. My time was, for some weeks, profitably employed, and I resolved to make an excursion to the province of Bantam.

In prosecuting this tour I passed through Batavia, and while expecting the local assistance to proceed, Major Travers arrived, in the ship 'Lady Raffles,' with intelligence that Sir Stamford had reached Bencoolen, and with a cordial and pressing invitation to accompany the Major on his return, with all my collections and appendages. The accomplishment of this was facilitated by the destination of the vessel on the coast of Java; instead, therefore, of proceeding to Bantam, I accompanied the commander to Samarang, where my collections were safely conveyed

on board; and not many days after this auspicious event, I had the pleasure and satisfaction of saluting Sir Stamford at Bencoolen, and of being introduced to Lady Raffles.

Sir Stamford had further projected a voyage along the west coast of Sumatra, and a visit to Padang: the vessel in which my collections were embarked was engaged for this voyage, and as her subsequent destination was to return to Java, for the purpose of receiving a cargo for England, I readily embraced the opportunity of inspecting an interesting portion of the island of Sumatra.

During the voyage to Padang, which was uncommonly placid, I submitted to Sir Stamford the entire result of my previous labours.

The bulk of my collections was on board, and a number of chests had intentionally been left accessible; he therefore inspected so many of the quadrupeds, birds and insects, as well as of the botanical and geological specimens, as enabled him to form an adequate estimate of the extent of the collection in these departments, and of the state of its preservation. He likewise examined the drawings, maps and manuscripts with patient attention, and was consequently enabled to describe the whole from personal observation.

It is foreign to my object to extend this hasty sketch by any remarks on the expedition to Padang, or on the visit to the interior of Sumatra, which was subsequently undertaken from that place. I may, however, be allowed to state, that this journey afforded me a striking opportunity of noticing the beneficial and invigorating effects of European atmosphere and society, in the example of Sir Stamford and of Lady Raffles, and of contrasting it with the debilitating and apathetic influence of a long residence in an equinoctial climate, as exhibited in my own person.

Indeed, while prosecuting this route, I was frequently at a loss whether most to admire the energy and enterprise of Sir Stamford in surmounting obstacles, and in employing every practicable effort towards obtaining new and valuable information; or the patience, perseverance and fortitude displayed by Lady Raffles, under circumstances of difficulty and danger, which would have presented insurmountable terrors to most female minds.

On our return to Bencoolen, Sir Stamford added several very important acts of kindness to the favours already conferred on me; he made the necessary arrangements with the commander of the vessel in which my passage to England was engaged; he supplied me with letters of introduction to his numerous friends; and he added to the official communication to the Honourable Court of Directors which accompanied me, a copious description of all the collections under my charge. The vessel being destined to receive part of her cargo at Surabaya, I was enabled to employ several months very advantageously in Java.

From Batavia I made an excursion in a western direction to Bantam. I then proceeded, through the interior, to the Priangan Regencies. At Tji-anjur I left the road for an excursion to the Mountain Gedĕ; and along the further route to Samarang, I had many opportunities of correcting and extending my former observations. In the month of January, 1819, I went on board at Samarang, and in July I arrived in London.

At this time my herbarium was without any scientific arrangement. The specimens composing it were carefully disposed and numbered as they were successively collected in my travels, chiefly with the view to preserve an accurate record of their localities, of their respective elevation above the level of the ocean, of the soil in which they grow, and of such other particulars as were considered requisite for giving a general view of the geographical distribution of the plants of Java.

On my arrival in England the zoological collections required my first attention, both with a view to their preservation, and to their exhibition in the Honourable Company's Museum. It was, therefore, no less advantageous to myself than important to science, that Robert Brown, Esq., with a ready and disinterested zeal, undertook the examination and arrangement of my herbarium.

After much time and labour, every specimen of an extensive series of duplicates was examined, all the species of each genus were brought together, the entire herbarium was distributed into families according to the natural

method, and the basis of an accurate catalogue was formed. By this operation, the number of species composing the herbarium, which had previously been vaguely estimated, was determined to be 2196.

While engaged in this arrangement, Mr. Brown noted in each family those subjects which appeared to possess the greatest interest, either on account of their novelty or of their peculiarity in structure, and from the subjects thus noted he finally made a selection, which it was proposed to publish under the title of "Plantæ Javanicæ Rariores."

It was at the same time determined that a series of figures, for the illustration of all the subjects to be described in the work, should be prepared. Although a considerable number of drawings had been made in Java by native artists, these were found useful only in the representation of the general character and habit of the subjects.

Mr. Brown therefore undertook the task of preparing such dissections as were necessary for the illustration of the generic characters, or other interesting points of structure, and of generally superintending the execution of the drawings; to this portion of the work Mr. Brown cheerfully devoted particular care and attention, and his experience in analysis of vegetable structure will be duly appreciated by botanists. After the completion of the drawings and of the illustrative details, the subjects were put into the hands of the engraver, under the superintendence of Mr. Brown, who now commenced the preparation of the text. In the prosecution of this task, his public engagements and other important scientific inquiries accumulating in a degree beyond what was expected when he commenced the work, it was agreed between Mr. Brown and myself that the original plan should be modified, and that the assistance of a coadjutor should be obtained.

On this point I have the satisfaction to state, that J. J. Bennett, Esq., Mr. Brown's assistant in the botanical department of the British Museum, was found willing to prepare for the press such articles as were left unfinished by Mr. Brown, and likewise to cooperate generally in the preparation of the work. In accordance with this plan the title has been modified; and I have the pleasing duty, in this place, to acknowledge the ability and assiduity with which Mr. Bennett has performed the task he has undertaken. The minuteness of detail and extent of research with which he has elaborated the articles he has contributed, elucidate clearly and satisfactorily the characters and habits of the subjects, as well as the history of their discovery, and the labours bestowed on their investigation by preceding botanists. Mr. Brown has, agreeably to his original intention, contributed his remarks on the affinity and structure of the subjects described; he has also afforded many valuable suggestions in the progress of the work, and the whole has received his examination and revisal.

I embrace with pleasure and satisfaction the opportunity now afforded me of publicly expressing my great obligations to Mr. Brown. The examination and arrangement of my herbarium, the laborious duties connected with the superintendence of the figures contained in this work, the preparation of the illustrative details, and the time devoted to the description of the subjects, are by no means the only marks of friendship which I have received from that distinguished botanist; who ever since my arrival in England has afforded to me his advice and assistance in my researches connected with natural history, and on many other important occasions.

Having had the honour to dedicate

THE PLANTÆ JAVANICÆ RARIORES

TO

THE HONOURABLE COURT OF DIRECTORS OF

THE EAST INDIA COMPANY,

It is my grateful duty, at the close of the Work, to acknowledge, most respectfully, the liberal Patronage of that HONOURABLE BODY, by means of which I have been enabled to undertake and to complete its publication.

THOMAS HORSFIELD.

Library, East India House,
April 9th, 1852.



PLANTÆ JAVANICÆ RARIORES.

POLYPODIUM (DIPTERIS) HORSFIELDII.

TAB. I.

CHAR. SUBGEN. (DIPTERIS) *Sori* subrotundi, sparsi (v. transversim subseriati), inter (frondis palmatæ) venas primarias dichotomas earumque divisiones, vènulis divaricatissimis anastomosantibus insidentes. *Indusium* (verum) nullum.

Caudex *repens teres.* Frondes *elongato-stipitatæ binatæ* ; partiales *dimidiatæ palmato-lobatæ.* Venulæ *secundariæ tertiariæ et ultimæ divaricatissimæ, crebre anastomosantes, penultimæ latere soriferæ, ultimæ apice vix dilatato libero.* Indusium spurium *vel* (*in* D. Horsfieldii) *pili sorum cingentes et capsulis intermixti ; vel* (*in* D. Wallichii) *materia pulposo-gummosa capsulas immaturas obtegens.*

POLYPODIUM (DIPTERIS) *Horsfieldii*, frondis binatæ palmatæ subtus glaucæ lobis serratis, soris pilosis.

Dipteris conjugata. *Reinw. in Syllog. Pl. Nov. Soc. Bot. Ratisb. tom.* 2. *p.* 3.
Polypodium Dipteris. *Blume Enum. Pl. Jav. p.* 135.

DESCR. Filix 2—3-pedalis, vel elongatione stipitis usque orgyalis. Caudex repens crassitie pennæ olorinæ fibrillas copiosas nigricantes subramosas dimittens squamisque rigidis strigosis atris subulatis setaceo-acuminatis tectus, solidus, constans ligno quasi duplici, utroque e cellulis elongatis impunctatis

utrinque acutis composito, cum strato interposito tubum completum constituente, e vasis scalariformibus in laminam transversim interrupte striatam vix definitæ latitudinis facilè, ut in plerisque Filicibus Lycopodineisque, solubilibus. Stipites elongatæ frondem ipsam sæpius superantes crassitie pennæ annatinæ, adultæ glabræ læves pallidè castaneæ teretiusculæ anticè canaliculatæ; vasis scalariformibus tubum ferè completum anticè deficientem efformantibus. Frondes ad basin usque bipartitæ potiusve binatæ; partiales dimidiatæ palmato-lobatæ, lobis incisis indivisisque acuminatis serratis; novellæ utrinque tectæ vellere ferrugineo-castaneo e pilis articulatis laxis constante; adultæ glabratæ pilis nonnullis secundum latera venarum primariarum aliisque soros cingentibus relictis. Venæ primariæ dichotomæ validæ, subter prominentes teretes, super vix emersæ, divisionibus ultimis sæpe infra apicem acuminatum lobi conniventibus et unitis. Venulæ secundariæ et tertiariæ divaricatissimæ creberrimè anastomosantes areolas subquadratas sed amorphas efformantes, ultimæ liberæ apice vix dilatato. Epidermidis areolæ minutæ parietibus paulo flexuosis. Stomata in pagina tantum inferiore. Sori parvi subrotundi passim e confluentia duorum amorphi, lateribus venularum tertiarium sæpiusque ubi plures confluunt insidentes, novelli pilis articulatis copiosis semitecti, adulti pilis brevioribus capsulis interstinctis. Capsulæ brevè pedicellatæ annulo verticali incompleto lateribus areolatis. Spora lævia subovalia inæquilatera margine altero convexo altero rectiusculo.

Obs. I.—Dr. Horsfield, who discovered this remarkable species in 1814, has the following observations respecting it.

"I have four localities for this Fern. The most western is the mountain Karang, situated south of Bantam; next the mountain Gede, south of Batavia; proceeding westward, Ptarangan; and finally Mount Prahu; the latter lies south-west of Samarang. It is remarkable that I never noticed it in my numerous excursions through the eastern provinces; and I have concluded that it is not at all, or at least that it is very rarely, found eastward of the longitude of Samarang, which lies near the middle of the island, as far as regards its extent from west to east. From its striking physiognomy it could not, I think, have escaped my notice.

"It grows in clusters with fronds of different height, the tallest often equalling five or six feet.

"Its range is above that at which rice can be cultivated in Java, which is about 5000 feet above the level of the ocean. It springs from the black vegetable mould, which very generally covers the mountains of Java."

Obs. II.—Before entering on the subject of the affinities of *Polypodium* (*Dipteris*) *Horsfieldii*, there are some parts of its structure deserving of notice.

In the first place, the existence of the complete circle of vasa scalariformia separating the ligneous or fibrous vessels of the caudex into an outer and inner portion, though not peculiar to Dipteris, seems to be of rare occurrence among Ferns. It exists however, in the caudex of Platyzoma (though not in that of Gleichenia); and I have observed it also in some (probably it will be found in all) species of Anemia.

I have described *Polypodium* (*Dipteris*) *Horsfieldii* as having hairs surrounding the sorus, and mixed with the capsules, while in the nearly related species *Polypod.* (*Dipteris*) *Wallichii*, the capsules, even when fully formed, are imbedded in a gum-like pulpy substance, the remains of which may always be found, even after the spora are discharged. In the dried specimens examined this pulpy substance had no appearance of organization; in the living plant, however, it will probably be found to be minutely cellular, as I have observed in the nascent sori of several species of Polypodium, in which the production of this cellular pulp precedes the formation of the capsules, and is generally evanescent soon after they become visible. The peculiarity in *Polypod.* (*Dipteris*) *Wallichii* probably, therefore, consists merely in the longer duration of this substance, in which perhaps the capsules of the greater number of Polypodia are formed.

Obs. III.—The Fern here described, and the nearly related species *Polypodium* (*Dipteris*) *Wallichii*, form a very distinct section or subgenus of Polypodium, to which they must be referred, while the characters of that genus consist merely in its round sori, and absence of true indusium. But in adding two species, having so singular a habit, to a genus already too extensive, and including so many different forms, it must be evident that the present sources of generic distinction in this Natural Family are very insufficient for its satisfactory analysis.

The number of Ferns at present known, including unpublished species existing in collections, may be stated at upwards of 1800. The Family has been subdivided into five primary groups. These groups are strictly natural; they are not, however, of equal value as to the importance of their characters, and they are extremely unequal in extent; the great mass belonging to that called Polypodiaceæ, which has been divided into upwards of fifty genera, and contains about 1600 species. Of this number nearly one half, or 800, belong to five genera, namely, Polypodium, Aspidium, Nephrodium, Asplenium, and Pteris, as they are at present constituted, Polypodium alone consisting of about 300 species. The extent of Polypodium, therefore, renders its subdivision into natural sections or subgenera absolutely necessary.

For such subdivision, not in Polypodium only, but in other extensive genera of Ferns the most obvious, as well as the most advantageous source of character seems to be the modifications of vascular structure, or the various ramifications of the bundles of vessels, or veins of the frond, combined with the relation of the sori to their trunks or branches.

On this subject many important observations have been made, and subdivisions founded on them proposed by several writers, especially MM. Bory, Gaudichaud, Kaulfuss, Ad. Brongniart, and Blume. I may add, that I have at a still earlier period introduced the ramification and relation of sori to veins into the definitions of several genera, in which these characters had not been before employed, and have more recently, in treating of *Matonia*, pointed out a natural and extensive group in Polypodium, as being readily distinguishable by the sorus originating at the point of confluence of several veins.

With respect to Dipteris, the section to which our plant belongs, there is no difficulty in distinguishing it from all other groups of Polypodium, and particularly from that now alluded to, if the dichotomous ramification of the primary veins be admitted into its definition. And as that ramification may be said to be necessarily connected with the peculiar division of the frond, this section, so constituted, appears to rest on characters at least as important as those of several groups at present generically distinguished from Polypodium, as Cyclophorus, Pleopeltis, Adenophorus, and even Grammitis, Selliguea, and Meniscium.

If, however, the dichotomous primary veins are left out of consideration, no sufficient character remains to distinguish Dipteris from that section of Polypodium, including P. quercifolium, diversifolium, and several other species, and which M. Bory has established, chiefly from the presence of dissimilar sterile fronds, as a subgenus under the name of Drynaria. But the existence of these sterile fronds being neglected, Drynaria cannot be separated from that more extensive section comprehending P. phymatodes, lycopodioides, &c., and to which (including Drynaria,) I have referred in my observations on Matonia, in Dr. Wallich's *Plantæ Asiaticæ Rariores.*

These three subdivisions of Polypodium agree in having their sori placed on the point of confluence, or perhaps sometimes of divarication, of several branches of the anastomosing veins; and Dipteris being distinguished by its dichotomous primary veins, the remaining two sections may form one subgenus, for which the name proposed by M. Bory may be adopted.

In many species of Drynaria so constituted, the principal vein of the sorus is manifestly that in which the tendency to produce capsules is generally the greatest in the natural order; namely, the lowest branch of the upper or inner side of the primary vein, or that branch which in the appendix to Captain Flinders's Voyage is considered as having a relation to two different trunks; in other species, in those particularly where the sori are most numerous, and not confined to that branch, it is often difficult to determine the most important vein of the sorus; and in Dipteris it is hardly practicable.

From Drynaria, and from those species of it especially in which the principal vein of the sorus is distinctly

marked, the transition is easy to Polypodium aureum, decumanum, and a few other species having anastomosing veins, and in which the sori are placed on the apices of two, or more rarely three, connivent ultimate ramuli, included in an area formed by the anastomosing secondary veins. But these species, from the identity of habit, may be included in, or appended to, a more extensive group, whose anastomosing veins form areæ or meshes, in each of which only one sorus exists, and that terminating a single included branch. This section, which may be named PHLEBODIUM, and whose species have either pinnate, deeply pinnatifid, or more rarely simple fronds, appears to me strictly natural, though it includes several species having the spurious indusium of Pleopeltis, and at least one with an oval or even oblong sorus.

Next to Phlebodium in affinity, as well as in the arrangement of the sori, may be placed a group, most of whose species have simple fronds, and all of which are natives of America. In this group, which may be distinguished by the subgeneric name CYRTOPHLEBIUM, the primary parallel veins are connected by transverse arched branches, from the convex upper side of which generally three (and never more than three) upright parallel simple veins arise, terminating within the area included between the proximate transverse arched branches: of these simple tertiary ramuli the two lateral are soriferous, generally below the apex, the middle branch being always sterile. In one species at least this branch reaches, and is united with, the arched secondary vein above it; and in a few others it is entirely wanting. This arrangement in Cyrtophlebium produces two series of sori between each primary vein, except in the lowest area, or that next the midrib, in which there is one only, and that terminating the single vein exactly as in Phlebodium, into which this group passes by species having the habit of Cyrtophlebium, but with fronds so narrow, that they are reduced to the lowest areolæ, and consequently agree in character with Phlebodium.

An arrangement of veins and of sori analogous to Cyrtophlebium exists in the real species of CYCLOPHORUS or Niphobolus, none of which are natives of America: in all these the secondary veins are straight and parallel, instead of being arched; they are also given off at an angle more or less acute from the primary parallel veins, which they connect; and the tertiary or ultimate branches originating only on the upper side of each secondary vein are parallel with each other, more than three in number, and all of them bearing terminating sori.

An extensive and strictly natural group may be next noticed, though it cannot be considered nearly akin either to any of the preceding sections or to the principal part of that which follows.

This group or subgenus, the LASTREA of M. Bory, whose fronds are either bipinnatifid or simply pinnate, is chiefly intratropical. Its character consists in the secondary veins of the pinnate, and the only veins of the segments of the bipinnatifid fronds being perfectly simple and parallel, with one known exception reaching the margin of the segment, or in the pinnate species uniting with the corresponding vein, and each bearing a lateral sorus, generally about the middle, in some cases near the base, and in a few others proceeding from the base itself.

The closest affinity of Lastrea is not to any group of Polypodium, but to that section of Gymnogramma, the division of whose fronds, and the disposition of veins, are exactly similar, and in which the sori form very short lines of like origin. As the only distinction therefore consists in a difference, generally very slight, in the form of the sorus, it appears to me (and Dr. Blume has made a similar remark,) that these two tribes cannot be generically separated, especially as species belonging to both agree in having pilose capsules; and it is at least certain, that the section of Gymnogramma referred to should be removed from that genus, and if still distinguished as a genus or subgenus, might receive the name of PLEUROGRAMMA.

This section is also manifestly related to MENISCIUM, which, though readily distinguished by its technical character, may be considered as a subgenus of Polypodium, nearly approaching in vascular structure to the pinnate species of Lastrea, but differing in the sori terminating the corresponding veins at their point of junction, and by their confluence forming a semilunar line. It is deserving of remark, that in some, and especially the original species of Meniscium in that part of the frond where the power of producing capsules is the weakest, the sorus is transferred from the point of union of veins to the upright branch arising from that point, and from semilunar becomes round or sublinear.

Lastrea may even be considered as approaching in affinity rather more nearly to that section of Nephrodium, which M. Gaudichaud has separated under the generic name of Polystichum, than to any subdivision of Polypodium; an approximation which appears to be confirmed by more than one fern, entirely agreeing in habit, in undivided veins and lateral fructification with this group of Nephrodium, but having a short linear sorus, with an Indusium of corresponding form, inserted by its longitudinal axis in the middle of the sorus. To this group the name of MESOCHLÆNA may be given; and though in general appearance it is abundantly different from Didymochlæna, it can only be distinguished from that genus, according to my view of the structure of its indusium, by its simple veins and lateral sori.

The most extensive but least natural section of Polypodium is that in which none of the veins anastomose, the sorus standing either on the apex, generally more or less dilated, of the branch, or distinctly below the apex, which is then scarcely or not at all dilated; the vein when simple, or its upper soriferous division when branched, terminating within the margin of the frond or pinna.

Polypodium vulgare is one of the best examples of this section, which, however, comprehends species with undivided, pinnatifid, pinnate, bipinnate, and even decompound fronds, and these as various in texture as in division. Many species are found within the tropics; but the section includes all the European Polypodia and most of those found in the higher latitudes of the southern hemisphere.

As this section includes many of the earliest described species of Polypodium, it would require, if retained entire, no subgeneric name. But in a complete analysis of the genus it ought to be divided. The strictly natural subdivisions, however, can hardly be characterized from modifications of vascular structure alone; and I have not yet been able to detect sufficient differences, either in the capsules or seeds, by which they may be distinguished.

That subgeneric or sectional characters may in several instances be obtained or assisted from the seeds of this Natural Order is not improbable, and in one case, namely CERATOPTERIS (or Teleozoma), including Parkeria in that genus, even the generic character appears chiefly to reside in the seeds, which in their unusual size and peculiar marking or striation entirely agree in all the species of the genus, while in the original species the annulus is nearly complete; and in Parkeria, differing from the rest of the genus in no other point whatever, the ring is reduced to a few faint striæ. R. BR.

TAB. I. *Fig.* 1. A frond of *Polypodium* (*Dipteris*) *Horsfieldii*, of the natural size. *Fig.* 2. A portion of the under surface magnified, showing the arrangement of the veins and sori. *Fig.* 3. Another portion of the same, from which a sorus has been removed to show its insertion. *Fig.* 4. A sorus, more highly magnified. *Fig.* 5. A capsule before bursting. *Fig.* 6. A capsule after bursting. *Fig.* 7. Sporules.

POLYPODIUM PAPILLOSUM, *Bl.*

TAB. II.

POLYPODIUM *papillosum*, caudice repente, frondibus elongato-linearibus ad rachin ferè pinnatifidis membranaceis stipiteque glaberrimis : laciniis approximatis linearibus obtusiusculis apicem versus obsoletè crenulatis, venulis simpliciter furcatis : ramulo superiore apice intra marginem sorifero, soris saccatis.

Polypodium papillosum. *Bl. Enum. p.* 131.

DESCR. Filix bipedalis. Caudex repens, crassitie pennæ anserinæ; paleis densè imbricatis nigrescentibus, laxè reticulatis, ovato-lanceolatis, vestita; radiculas fibrosas, tenues, breviter ramosas, hirtas, dimittens; hinc inde stipites solitarias, basi articulatas, exserens. Stipes 6—8-pollicaris, glaberrima, basi semiteres; indè anticè latè sulcata; apicem versus, ut et rachis anticè posticèque, rotundata, sulco in strias duas superficiales abeunte. Frons sesquipedalis, angustè lineari-lanceolata, acuminata, infernè 3 supernè 2 pollices lata, glaberrima, ferè ad rachin pinnatifida, laciniarum sinubus angustis. Laciniæ (35—50), subalternæ, approximatæ, oblongo-lineares, obtusiusculæ, integerrimæ, nisi ad apicem obsoletè crenulatum; nervo medio tenui flexuoso, utrinque venis brevibus simpliciter furcatis instructo. Venarum ramuli ante marginem evanescentes, superiores ad apicem soriferi, in apicibus laciniarum steriles. Sori utrinque in serie simplici submedianâ 6—12, foveolis saccatis profundè immersi, papillis in paginâ superiore eminentibus insignes. Capsulæ numerosæ, imæ foveolæ pedicellis longis affixæ, annulo latiusculo 15—20-articulato peripheriæ ultra $\frac{3}{4}$ circumdante instructæ. Spora plurima, lævia, subovalia.

The sori of this elegant species are more deeply immersed than those of any other with which I am acquainted, being completely buried within the sac, which forms a mammillary protuberance of considerable height on the upper surface of the frond. It is also, as far as I am aware, the only described species with immersed sori, in which the sori are seated on the terminations of the veins or of their branches within the margins of an unreticulated frond; and consequently the only one that belongs to the same great section with the *Polypodium vulgare*, L., for which Mr. Brown has retained, as a subgeneric name, the original designation of the entire group.

The far greater number of species with immersed sori belong to two of the subgenera, distinguished by Mr. Brown in the preceding article. The most extensive group*, consisting of *P. phymatodes*, L., and its allies,

* See Mr. Brown's note on *Matonia* in Dr. Wallich's *Plantæ Asiaticæ Rariores*, vol. i. p. 16.



POLYPODIUM PAPILLOSUM

(among which may be reckoned *P. incurvatum*, *P. laciniatum* and *P. longissimum* of Dr. Blume*, and *P. alternifolium* of Dr. Wallich†,) have their sori seated on the anastomosing branches of a compoundly reticulated frond, and form part of that section of *Drynaria* which is distinguished by the absence of sterile fronds. In *P. subauriculatum*, Bl.‡, on the other hand, as well as in *P. verrucosum*, Wall.§, *P. fraxinifolium*, Jacq., and some others, in which the sori are also immersed, they terminate a simple vein, included singly within the mesh of a simply reticulated frond; and these species consequently belong to Mr. Brown's subgenus *Phlebodium*. I am not aware of the occurrence of immersed sori in any of the other subgenera of reticulated *Polypodia*.

From *P. vulgare* and its immediate allies, as well as from most of the species of the same extensive subgenus, *P. papillosum* appears to be further distinguished by the mode of ramification of its veins, which have no lateral branches, but terminate in a simple bifurcation. The same mode of ramification occurs in *P. curvatum*, Sw., and in *P. pectinatum*, L.; but in the latter species there is an occasional tendency to further subdivision, in an additional rudimentary bifurcation of the sterile branch. *P. pectinatum* consequently forms a natural transition to the structure of *P. vulgare*, in which there are commonly one or two lateral branches, in addition to the terminal fork, the branch first given off from the upper side of the vein being as usual soriferous, and the other branches being sterile with simply dilated apices. Another modification of the same mode of veining occurs in a species from the Mauritius in the Banksian herbarium, as yet I believe undescribed, which combines the ramification of *P. vulgare* at the broad base of its laciniæ, with that of *P. papillosum* towards their narrowed termination. The species in question is further remarkable for its coriaceous texture, and the white, apparently calcareous, secretion intermixed with its capsules, and entirely concealing them in their young state, which forms a kind of spurious involucre, analogous to the gum-like pulpy substance described by Mr. Brown, in the preceding article, as imbedding the capsules of *Polypodium* (*Dipteris*) *Wallichii*, and other species of the genus.

On the other hand there exists a group of considerable extent distinguished by a still more simple veining even than that which occurs in *P. papillosum*, to which Dr. Blume has applied the name of *Ctenopteris*‖. In this section, which although not strictly natural includes many species of nearly similar habit, the veins support a single sorus at their apex, forming part of a simple series arranged within the margins of the laciniæ on either side, and have neither lateral branches nor terminal bifurcation. *P. parvulum*, *P. asplenifolium* and *P. Otites* may be cited as examples of this form, in addition to the Javanese species enumerated by Dr. Blume; and a remarkable undescribed species in the Banksian herbarium, collected in Ceylon by Moon, affords an instance of the occurrence of immersed sori in this subdivision of the genus. In this very curious species the sori are not only immersed, but (as was pointed out to me by Mr. Brown) furnished with a very peculiar kind of spurious involucrum; the margins of the aperture of the sac in which the capsules are buried, being closely approximated in the young state, and separating, as they approach maturity, by a regular fissure in the direction of the vein, which gives them at this period the appearance of an expanded, slightly projecting, and finally cup-shaped, indusium.

Dr. Horsfield has noted that *Polypodium papillosum*, "Pakkis of the Javanese, grows abundantly in most parts of Java, in open places, on hedges, &c., at an elevation of 1000 feet above the level of the ocean."

I. J. B.

TAB. II. *Fig.* 1. A frond of *Polypodium papillosum*, of the natural size. *Fig.* 2. A portion of one of the segments of the frond magnified, exhibiting the under surface, veins, and arrangement of the sori. *Fig.* 3. The upper surface of the same, with the protuberant papillæ in which the capsules are immersed. *Fig.* 4. A vertical section of a sorus and of its sac. *Fig.* 5. A single capsule, with its stipes. *Fig.* 6. Sporules extracted from the capsule.

---

* *Enumeratio Plantarum Floræ Javæ*, pp. 126—127, 131.

† List, No. 289.

‡ l. c. p. 133.

§ List, No. 296.

‖ *Flora Javæ, Filices*, p. 132.

ATAXIA HORSFIELDII.

TAB. III.

ATAXIA, *Br. in Chlor. Melv. p.* 35. *Kunth, Agrost. Synopt. p.* 39.

CHAR. GEN. *Gluma* locustam trifloram subæquans. *Flosculus inferior* masculus bivalvis; *intermedius* univalvis neuter: uterque dorso aristatus; *terminalis* hermaphroditus diandrus.

Gramen *tam habitu quam structurâ inter* Anthoxanthum *et* Hierochloam *medium, pariterque odoratum.* Gluma *inæquivalvis.* Flosculi *a basi brevissimâ persistenti racheos conjunctim solubiles.* Valvula superior hermaphroditi flosculi *uninervis;* staminibus *axibus valvularum oppositis.*

OBS. *Ataxia* along with *Hierochloe* and *Anthoxanthum* form a very natural and well characterized section, which belongs rather to the tribe *Avenaceæ* than to *Phalarideæ*; and these three genera are in reality so nearly related that they may perhaps be more properly considered as sections of one and the same genus; or at least *Hierochloe* and *Ataxia* might be united. It is deserving of notice that in all of them the upper valve of the hermaphrodite flosculus has a single nerve occupying its axis, and that one of the two stamina is placed opposite to this nerve. The coexistence of these two characters, both of which are remarkable deviations from the usual arrangement in Gramineæ, seems to invalidate the hypothesis respecting the composition of the inner valve of the flower in this family*. It might, however, be assumed that the median nerve in these genera is formed of two confluent cords, a view to a certain extent supported by the somewhat analogous structure in the corolla of Compositæ. It might also be assumed that the stamen belongs to the inner or complementary series, which is rarely developed in triandrous genera. One remarkable apparent exception to the usual order of development of stamina occurs indeed in a genus of grasses found in Abyssinia by Dr. Rüppell, to whom I am indebted for the specimens I have examined. In this genus the locusta contains apparently a single flower, of which the gluma consists of two minute obtuse nerveless valves; the perianthium is formed of two valves nearly equal in size, form, texture and nerves, which are three in number, the middle nerve of each valve ending in a seta; the stamina are three in number, but instead of being inserted as I have described those of triandrous grasses generally to be, they are placed within the upper or inner valve, the middle stamen being opposite to the median nerve; the embryo also is placed on the side of the inner valve: hypogynous squamulæ are entirely wanting. If the flower here described be really simple, it would present a still more formidable objection than *Ataxia* to the composition of the inner valve of the perianthium. But the arrangement of stamina, and direction of scutellum or embryo, suggest another hypothesis with respect to the Abyssinian genus; namely, that the flower is not simple, but

* General Remarks, &c. in Flinders's Voyage, vol. ii. App. p. 580.



[illegible]

made up of two flowers reduced to their outer valves. This latter view I am disposed to adopt, not only on considering the usual order of suppression of the parts of the floral envelope in grasses; but from the same degree of reduction actually existing in several *Paniceæ*, to which primary division of *Gramineæ* the Abyssinian genus would according to this view belong. It may be added that the genus referred to very remarkably agrees, both in habit and structure, with an unpublished genus discovered by Ehrenberg, likewise in Abyssinia, (*Podopogon*, Ehrenb. MSS.), and which unquestionably belongs to this primary division of the order. R. Br.

Ataxia *Horsfieldii*, Kunth, Agrost. Synopt., p. 39, ex descr. R. Br. in loco supra citato.

Descr. Gramen bipedale suberectum. Radix fibrosa, radiculis brevibus tomentosis. Culmi plures: unicus fertilis; reliqui breves, steriles, ex internodiis duobus vel tribus, foliisque totidem, constantes. Culmus fertilis 5—6-nodosus, ad nodos quandoque geniculatus, compressus, striatus, glaberrimus; internodiis binis vel ternis superioribus semi-exsertis. Nodi impressi, ferruginei, glaberrimi. Vaginæ foliorum ad basin usque fissæ, 3—4-pollicares, glabræ, striatæ, convolutæ; margine tenui, membranaceâ, ciliatâ, in ligulam brevem, membranaceam, rotundatam, pariter ciliatam desinente; flexurâ inter vaginam laminamque extùs quoque ciliatâ. Foliorum laminæ planæ, glabræ, striatæ, lineari-lanceolatæ, apice elongatæ, 6—9 pollices longæ, basin versus 3—4 lineas latæ. Panicula 3—4-pollicaris, stricta, simplex; ramis subsimplicibus, in racheos parte inferiori 2 vel 3 simul natis pollicaribus, supernè brevioribus solitariis. Rachis striata, glabra; ramis hic illic rariter pilosulis. Locustæ brevi-pedicellatæ; pedicellis pubescentibus. Gluma bivalvis, mutica, membranacea, glabra; nervo medio valvulæ utriusque apicem versus minutè denticulato: exterior latè ovata, uninervis; interior sesqui-longior, ovata, trinervis. Flosculus inferior et intermedius subsessiles: inferior glumâ exteriore sesqui-longior, bivalvis; valvulâ exteriore sericeo-pubescente, lineari-ovatâ, apice bifido, trinervi, nervo medio ab incisurâ libero valvulam paulò superante breviter aristatâ; interiore hyalinâ, lineari, binervi; staminibus tribus, axi valvulæ inferioris nervisque superioris oppositis, filamentis brevibus, antheris longo-linearibus. Flosculus intermedius univalvis, valvulæ flosculi inferioris exteriori æqualis et simillimus; aristâ tamen prope basin solutâ, valvulâ duplo longiore, infernè ferrugineâ, glabrâ, prope apicem valvulæ geniculatâ, et inde a geniculo minutè denticulatâ. Flosculus terminalis breviter pedicellatus, bivalvis: valvulis nitidis, hyalinis, muticis; exteriore rotundatâ, apice brevissimè emarginato, 9—11-nervi; interiore ovato-lineari, uninervi; lodiculâ nullâ; staminibus duobus tantùm, valvularum axibus oppositis, iis flosculi masculi simillimis; caryopside parvâ, ovatâ, glabrâ; stylis duobus ad basin usque distinctis; stigmatibus longissimis, plumosis.

With reference to the difference in the number of stamina between the male and hermaphrodite flowers of *Ataxia*, it may not be uninteresting to examine the various modifications which take place in grasses in the number of these organs, and the relation which these modifications severally bear to the composition of the perianthium. According to the well-known hypothesis of Mr. Brown*, the inner or proper envelope of the flower of a grass, the corolla of Linnæus, and calyx of Jussieu, "forms in reality the outer series of the true perianthium, whose inner series consists of the minute scales, never more than three in number," which were included by Linnæus† under the term nectarium, and have been called *squamulæ* by Jussieu, and *lodicula* by Palisot de

* General Remarks, &c. in Flinders's Voyage, vol. ii. App. p. 580—583.

† *Fundamenta Agrostographiæ* in *Amæn. Acad.* vii. p. 179.

Beauvois. This outer series of the perianthium, although apparently consisting of only two valves, has the upper or inner of those divisions usually furnished with two nerves equidistant from its axis, indicating that it is in reality composed of two confluent valves; and this composition is confirmed by the position of the stamina in triandrous grasses, in which "one stamen is opposed to the axis of the lower or outer valve, and the two others are placed opposite to the two nerves of the upper valve," as well as by the alternation of the inner series, or squamulæ, with the component parts of the outer. The observations which I am about to offer on the structure of those grasses in which deviations occur from the ordinary number of stamina will, I think, be found perfectly to accord with this view of the subject, and to afford perhaps some additional arguments in its favour.

Assuming, with M. Kunth*, and in conformity with the general principle laid down by Mr. Brown†, that the full number of stamina in a complete gramineous flower is six, we may select *Bambusa* and some of the genera most intimately related to it, as approaching most nearly, in their hermaphrodite flowers, to complete development, as far as regards the stamina and the parts of the perianthium. In these flowers the number of stamina actually developed is six; and the full number of squamulæ, forming the inner series of the perianthium, being also present, a separation of the inner valve of the outer series into its two component parts, the axes of which are marked by two strong and distant nerves, is all that is wanting to render obvious the composition of the flower of two alternating series of envelopes, each of three parts, and each part corresponding with the insertion of one of the stamina.

If from this case (in which "a third squamula exists opposite to the axis of the upper valve of the proper envelope, or to speak in conformity with the view already taken of the structure of this valve, opposite to the junction of its two component parts‡,") we pass to *Oryza* and the genera immediately related to it, such as *Potamophila*, *Zizania*, and the hexandrous species of *Leersia*, we again find the full complement of stamina, but unaccompanied by the third or posterior squamula, while the inner valve of the perianthium is strongly marked by three nerves instead of two, the additional nerve occupying the axis of the valve, or, theoretically speaking, the line of junction between its component parts. I know not whether it is allowable, in these instances, to suppose that the missing squamula may have become confluent with the component parts of the upper valve of the outer series, and thus to account for the formation of the additional middle nerve; but it is important to observe that the stamina bear the same relation to the several parts as in *Bambusa*, the position of the posterior stamen being opposite to the middle nerve, which, as far as this relation is concerned, evidently occupies the place of the missing scale. This middle nerve, however, continues to exist in the triandrous species of *Leersia*, and in *Leersia monandra* (which is in reality diandrous), unaccompanied by its corresponding stamen; but these anomalous species can only be regarded as accidental deviations from the more perfectly developed structure which obtains in this and the neighbouring genera. In the triandrous species of *Leersia*, it may be observed, the structure is that which prevails in the great majority of the order, the remaining stamina being the outer series, or that which corresponds with the outer valve of the perianthium and with the two lateral nerves of the inner valve; in the diandrous it is only the two latter that remain.

In the male flowers of *Pharus* and *Leptaspis*, as in those of *Zizania*, the entire number of stamina still continues to be found, and occupying the same relative position; but in these genera the middle nerve of the upper valve of the perianthium is wanting, as well as all the squamulæ, and the inner series of stamina consequently occurs without the corresponding inner series of perianthium. I know of no other instance among Monocotyledonous plants in which the entire obliteration of one series of the perianthium takes place concurrently with the persistence of the other series, and of the complete number of stamina; but a similar structure is of frequent occurrence among apetalous dicotyledons, in which the deficiency likewise occurs in the same series.

In *Ehrharta*, the only remaining permanently hexandrous genus, the two anterior squamulæ are again found

* *Agrostographia Synoptica*, i. p. 4.

† In Denham's Narrative, App. p. 237.

‡ Mr. Brown in General Remarks, &c., l. c.

largely developed, and the two lateral nerves of the upper valve of the perianthium are so closely approximated as to have led Professor Link* and M. Kunth † severally to describe that valve as carinated, a term which seems to imply the existence of a middle nerve. The nerves are in most of the species extremely slender, and in some almost obliterated: they are separated only by a narrow band of pellucid membrane, and might in some cases be readily mistaken for the thickened margins of a single central nerve. In this genus again the stamina occupy the same relative position as in all the preceding, and none of the corresponding parts of the perianthium are wanting, with the exception of the posterior squamula, the development of which may perhaps be impeded by the close approximation of the nerves of the upper valve (the axes of the alternating divisions of the outer series), while its absence is amply compensated by the increased development of the two remaining squamulæ.

The three genera most nearly related to *Ehrharta* offer a gradual reduction in the number of stamina, accompanied by a corresponding modification of structure in the upper valve of the perianthium. In *Tetrarrhena* and *Microlæna*, the number of stamina is reduced to four‡, and the upper valve has a single median nerve§. In *Diplax*, a MS. genus established by Solander on a New Zealand grass, nearly related to the foregoing, and especially to *Microlæna*, the stamina are still further reduced, being only two in number, and the upper valve continues to exhibit a single central nerve. For this modification in the structure of the upper valve we were prepared by the close approximation of the two lateral nerves in *Ehrharta*, and it may therefore not unreasonably be regarded as resulting from the confluence of the two ordinary nerves into one common trunk; and the valve may be considered either as perfectly simple, or as made up of two parts confluent even in their axes. To this single nerve is opposed a single stamen. In *Diplax* the two stamina, like those of the hermaphrodite floret of *Ataxia*, are anterior and posterior, or in other words opposite to the axes of the valves of the perianthium, and alternating with the two remaining hypogynous scales. The same relative position, anterior and posterior, occurs in two of the stamina of *Tetrarrhena* and of *Microlæna*; while the two others, which are lateral, are opposed to the axes of the hypogynous scales. Assuming that the posterior stamen is formed, like its corresponding valve, of two confluent parts, and that it belongs to the outer and not to the inner series, we have in *Tetrarrhena* and *Microlæna* a regular flower of four parts instead of six, and consequently an example among grasses of a structure not unusual in other monocotyledonous orders. On the contrary supposition, viz. that the posterior stamen belongs to the inner series, there would be no actual relation between this stamen and the valve to which it is opposed. The former of these hypotheses seems therefore in itself the most probable, and is, I think, confirmed by observation on specimens of *Tetrarrhena distichophylla* and of *Microlæna stipoides*, in both which the position of the lateral stamina is distinctly opposite to the axes of the hypogynous scales, while their insertion into the pedicellus of the ovarium seems to take place in a slight degree superiorly to that of the posterior as well as of the anterior stamen.

From *Diplax* the transition to *Anthoxanthum*, notwithstanding the wide difference in their habit and affinities, is, as regards the structure of these organs, easy and immediate. Both genera have a single hermaphrodite diandrous flower subtended on either side by a univalvular neutral floret, and protected by a two-valved glume; and the technical differences between them are limited to the absence of hypogynous scales in the latter, the modifications in the texture, form and relative proportions of their envelopes, and the size and insertion of their aristæ. In both the relation of stamina is the same, the single posterior stamen corresponding with the single median nerve of the upper valve of the perianthium, as the single anterior stamen does with the middle nerve of the lower. From *Anthoxanthum*, *Ataxia* and *Hierochloe* differ only in the transition of one or both the lateral univalvular neutral florets into bivalvular triandrous male flowers; and it affords a striking illustration of the relation borne by the stamina to the nerves of the perianthium, that there should occur within the same common involucrum triandrous flowers in which the two lateral posterior stamina are opposed to two lateral nerves in the upper valve

* *Hortus Berolinensis*, i. p. 233.

† *Agrost. Synopt.* i. p. 11.

‡ R. Brown, *Prodromus Floræ Novæ Hollandiæ*, p. 209, 210.

§ Kunth, *Agrost. Synopt.* i. p. 15, 16. and ii. p. 12.

of their perianthium, and diandrous in which the single remaining posterior stamen bears the same relation to the single middle nerve of the same part.

The latter disposition is again met with in a grass of a very different tribe from those to which our attention has hitherto been directed, *Crypsis aculeata*, which is also diandrous, with the stamina anterior and posterior, and the posterior stamen opposed to a single median nerve in the upper valve; a circumstance the more remarkable, as in *Crypsis schœnoides* (so nearly related as to have been long considered a variety of the same species) the ordinary triandrous structure occurs in the ordinary manner, the two lateral stamina being opposed to two nerves in the upper valve of the perianthium. These nerves, in the ordinary state of the valve, are brought so closely together as to give to it the appearance of a keel, but they are in truth widely separated by a fold of membrane of great tenuity and transparency. In another species of the same genus the tendency to separation appears to be carried still further, the very delicate membrane interposed between the two lateral nerves of the upper valve in *Crypsis alopecuroides* being described * as frequently bursting during the progress of the grain to maturity, and thus giving origin to two distinct valves in the place of the upper. It is almost superfluous to observe that the natural occurrence of this separation, unaccompanied by laceration of the parts, is all that would be required to render the outer series of the perianthium complete and regular †.

More commonly the existence of only two stamina in the flower of a grass is dependent on the obliteration of the anterior stamen, or that which is opposed to the axis of the lower valve, and the persistence of the two lateral posterior stamina opposite to the two nerves of the upper. This is the case in the diandrous species of *Sporobolus*, *Eragrostis*, and *Bromus*, in *Schmidtia*, in *Centotheca*, in *Melica gigantea*, Roxb. ‡, in *Leersia monandra*, as above noticed, in *Panicum diandrum*, as described by M. Kunth §, in *Imperata*, and in the diandrous flowers of *Microchloa* and *Phippsia algida*. The monandrous flowers of the last-named species are remarkable, as affording the only instance of which I am aware of a single stamen opposed to one of the lateral nerves of the upper valve of the perianthium ||, which are both strongly and distinctly marked.

In monandrous grasses generally the anterior stamen is that which is retained, as might indeed be expected *à priori*, from its position with relation to the first produced, and, generally speaking, the most largely developed portion of the perianthium. Such is the case in *Psilurus*, in *Chasmanthium*, and in the monandrous species of *Agrostis*, such as *A. crinita* and *A. sciurea*. In the latter species M. Kunth appears to have found three stamina; but this observation I have been unable to verify on any of the flowers that I have examined, all of which, in conformity with the character of the species given by Mr. Brown, were monandrous. The most marked deviation from the usual position of the single remaining stamen occurs in *Cinna arundinacea*, in which it is posterior and opposite to the single strong ciliated nerve forming the carina of the upper valve. Here again we have occasion to observe (in a case in which, considering the close relation apparent between this grass and those species of the Linnæan genus *Agrostis*, which have been of late generically associated with it, it could little have

* Trinius, *De Graminibus Uni- et Sesqui-floris*, p. 151.

† In commenting on the system of M. Raspail, in which the genus *Crypsis* is placed (*Ann. des Sci. Nat.*, iv. p. 451, table) among those which have "paleæ omnes imparinerviæ," M. Trinius (*Bull. des Sci. Nat.*, xi. p. 260, and xiii. p. 220.) states that the upper valve of the perianthium in this genus has two nerves. As often happens in similar cases of contradictory assertions, both are partially right; the species named by M. Trinius as those which he had repeatedly examined (*Crypsis schœnoides* and *Cr. alopecuroides*) having the structure indicated by him, while *Cr. aculeata* has that described by M. Raspail, who, however, enumerates *Cr. schœnoides* also as an examined species of the genus (*Ann. des Sci. Nat.*, v. p. 295). This remarkable difference in structure has not escaped the accurate observation of M. Kunth (*Agrost. Synopt.*, i. p. 21, 22.), who has founded on it a sectional division of the genus; but no botanist would probably be hardy enough to propose the generic separation of two such intimately related species as *Cr. aculeata* and *Cr. schœnoides*; and a system, the fundamental principle of which would place these species not merely in different genera but in different primary divisions of the order, can scarcely be regarded as resting on a secure foundation.

‡ *Panicum acariferum*, Trin., *Sp. Gram.*; but in reality *sui generis*, and in no respect related to *Paniceæ*.

§ *Agrost. Synopt.* ii. p. 71.

|| See Mr. Brown's observation in Parry's Voyage, App. Suppl. p. clxxxvi.

been expected,) the coincidence so often pointed out between a posterior stamen and a middle nerve in the upper valve of the perianthium *.

This coincidence, however, is not without exceptions. We have already seen that in the male flowers of *Pharus* and *Leptaspis*, and the hermaphrodite flowers of *Ehrharta*, a posterior stamen exists without any corresponding nerve or scale; and we have also seen that in the triandrous and diandrous species of *Leersia* a middle nerve exists in the upper valve of the perianthium without any corresponding stamen. This is also the case in *Colobachne*, in which the upper valve, when present, is distinctly single-nerved, but the stamina are three, disposed in the ordinary manner; and I believe in *Zoysia*, which is similarly triandrous, but in which the nerve is so indistinctly marked in the pellucid valve as to render it unsafe to assert its actual existence †. But in all these instances the suppression, or tendency to suppression, of different parts of the flower would naturally lead us to expect the occurrence of some disturbance in the relative position of the organs. Thus in *Pharus* and *Leptaspis* we find one entire series of the perianthium obliterated in conjunction with the complete suppression of the pistillum: in *Ehrharta* the tendency to the suppression by confluence of one of the two component parts of the upper valve (which is complete in *Tetrarrhena*, *Microlæna*, and *Diplax*) is manifested by the tenuity and close approximation of the lateral nerves: in the triandrous and diandrous *Leersiæ*, the suppression of parts is proved by the more perfect species of the genus, and by a comparison with all the nearly-related genera: in *Colobachne* the confluence of the two portions of the upper valve into a single-nerved navicular scale appears to be the last stage in

* The genus *Cinna* affords another instance in which M. Raspail and M. Trinius are at issue respecting the number of nerves in the upper valve of the perianthium, as well as upon other particulars of the structure of the locusta; but in this case it is not so easy to reconcile the discrepancies between them. M. Trinius admits however, in a later communication (*Bull. des Sci. Nat.*, xiii. p. 217.), that what he had at first described as two nerves forms in reality but a single carina capable of longitudinal subdivision, a circumstance which he regards as proving it to be composed of two distinct fasciculi; and the question would thus be reduced to one of theory and not of fact, were it not that he also describes as existing in most cases at the base of the upper valve the abortive pedicel of a second flower, which M. Raspail, on the contrary, declares that he has never been able to find, although he has dissected at various times more than four hundred flowers. I cannot explain why M. Trinius should speak of this organ as existing only in the greater number of instances, or why M. Raspail should never have found it at all, unless by supposing that in different varieties of the plant it may exist in very different degrees of development; for in every flower that I have examined, it has been so obvious as not to admit of a doubt of its existence. M. Kunth also notices it (*Agrost. Synopt.* ii. p. 163.), and he too, like M. Trinius, describes the upper valve as 2-nerved; but of this subdivision of the nerve there is certainly no outward indication, and its unity seems to me to receive strong confirmation from the position which I have noticed of the single remaining stamen opposite to its axis. Admitting this view of the unity of the nerve in question, (which accords with M. Raspail's own definition of the genus, "palea superior 1-nervia,") it is impossible to reconcile the coexistence of a middle nerve in the substance of the valve and of the distinct pedicel of a second flower, with a theory which supposes the latter, whenever it exists, to be formed by the detachment of the former from its cohesion with the valve. The assumption that it is an anomaly of rare occurrence, or the hypothesis that whenever the pedicel is found, the upper valve, although still apparently single-nerved, has in reality two nerves, seem to me to afford very inadequate answers to the objections founded by M. Trinius on the existence of this organ.

† In his first grand division, characterized as having "paleæ omnes imparinerviæ," M. Raspail enumerates ten genera of grasses, of which *Zoysia* is the first, distinguished, in common with *Leersia* or *Asprella*, as being destitute of glumes. But Mr. Brown (*Prodr. Fl. Nov. Holl.* p. 208.) had long since characterized *Zoysia* as having "gluma univalvis, perianthium bivalve," and its structure has recently been accurately described by M. Kunth (*Agrost. Synopt.* ii. p. 381.). In common with Palisot de Beauvois, M. Trinius and others, M. Raspail appears to have overlooked the true upper valve of the perianthium (which is indeed occasionally wanting), and to have mistaken for it the lower valve, at the same time substituting the single valve of the glume for the latter. If, as I believe, the true upper valve of *Zoysia* is obsoletely single-nerved, this rectification does not affect the position in his system which M. Raspail has given to the genus in question; but, taken in conjunction with the previous observations on the structure of *Crypsis* and *Cinna*, it may serve to show how hazardous it is to decide dogmatically upon a subject where the minuteness of the organs and their occasional variations have exposed so careful an observer as M. Raspail to the commission of such errors. Another example may be cited even in the same short list of genera with "paleæ omnes imparinerviæ," among which *Mibora* is associated with *Alopecurus* as having "flosculus fertilis 1-paleaceus," notwithstanding the statement of Mr. Brown (*Prodr. Fl. Nov. Holl.* p. 208.) that it has "perianthium certe bivalve," and the fact, which is readily perceived on a minute examination, that the upper valve is distinctly 2-nerved.

the process towards its complete obliteration, which occasionally takes place in both species of the genus: and the same may be said of *Zoysia*, the upper valve of which is also sometimes wanting. The two last-mentioned cases consequently form an easy transition to *Alopecurus* and *Trichodium*, in which the same valve is almost uniformly absent, while its corresponding stamina remain.

On the subject of *Ataxia* one other observation remains to be made. Some years since M. Kunth described, in the 'Annales des Sciences Naturelles' *, a specimen of a grass from the Cape of Good Hope, which he regarded as a variety of *Anthoxanthum odoratum*. Of this grass he has recently given a more complete description in his general work on the family †, where it still retains its place as a monstrous variety of the European plant; but so closely does it agree in almost every essential particular with the genus *Ataxia*, that M. Kunth questions whether it may not be actually referrible to it ‡. In one respect, indeed, the Cape grass would seem to recede still further from *Anthoxanthum* than *Ataxia* itself, and in the same degree to approach more nearly to *Hierochloe*; the intermediate neutral flosculus being described as sometimes bivalvular §, and even suspected to be occasionally furnished with imperfect stamina ‖. These successive gradations—from *Anthoxanthum* with both its lateral florets univalvular and neutral, through *Ataxia* with its lower lateral floret bivalvular and triandrous, to M. Kunth's grass, in which a second valve is also occasionally added to the upper of these florets, and *Hierochloe*, which obtains in this upper lateral floret the same degree of development as in the lower—serve to show how slight are the distinctions which separate these three very nearly related genera. They also serve to demonstrate, beyond the possibility of doubt, the real nature of the corolla of *Anthoxanthum*, as the lateral florets of that genus were called by Linnæus and all subsequent writers, until Mr. Brown ¶ detected the affinity subsisting between *Anthoxanthum* and *Hierochloe*, and deduced from it the true analogy of the parts of the locusta of the former,—an analogy long regarded by many botanists as paradoxical, but now, it would seem, universally admitted to be correct.

Ataxia, it may be added, affords the only instance among grasses in which the intermediate of three florets is less perfect than both the others. In the two great tribes of *Poaceæ* and *Paniceæ*, the tendency to imperfection exists, as Mr. Brown has shown **, in opposite directions, being uniformly downward in the latter, and almost universally upward in the former, the only exceptions hitherto noticed occurring in some few genera in which the outer flower is also imperfect. But in these the more perfect flowers occupy the intermediate station, while the reverse takes place in *Ataxia*. It was this deviation from the usual order of suppression that suggested the generic name.

"This grass," Dr. Horsfield states, "is named *Suket Kolonjono* by the Javanese: it grows at an elevation of between 6000 and 7000 feet above the level of the ocean, on several of the mountains of Java. It possesses when fresh a most delightful fragrance, resembling that of hay, but being more fragrant and volatile. In some districts of the territory of the Native Princes it is the exclusive property of the sovereign, and no subject is allowed to collect it for his own use. I first noticed it near the summit of Merapi, a volcano situated near the middle of Java, about 60 miles south of Semarang. It grows there in considerable abundance along the sides of the valleys and on the declivities. In my rambles I met the natives carrying bundles of it to the dwelling of the European superintendent stationed in those parts, who informed me that a number of natives were appointed to the particular service of furnishing a regular supply for the stables of the Emperor of Surakerta. The grass is mixed in small portions with the usual food of the favourite horses of the Prince, and is supposed to contribute to their vigour and spirit." I. J. B.

TAB. III. *Fig.* 1. *Ataxia Horsfieldii*, of the natural size. *Fig.* 2. A separate locusta magnified. *Fig.* 3. The same, deprived of its calyx. *Fig.* 4. The lowest, or male floret, separated. *Fig.* 5. The two remaining florets. *Fig.* 6. The intermediate, or neuter floret. *Fig.* 7. The upper, or female floret; all magnified.

---

* tom. xiii. p. 224.

† *Agrost. Synopt.* ii. p. 29.

‡ Ibid. i. p. 38.

§ *Agrost. Synopt.* ii. p. 29.

‖ *Annales des Sciences Naturelles*, tom. xiii. p. 224.

¶ *Prodromus Floræ Novæ Hollandiæ*, p. 209.

** General Remarks, &c. l. c.

Tab. IV.



SCLERACHNE PUNCTATA.

SCLERACHNE PUNCTATA.

TAB. IV.

SCLERACHNE.

CHAR. GEN. *Spicæ* androgynæ, fasciculatæ, singulæ involucro monophyllo foliaceo inclusæ; constantes locustâ inferiore (raró duâbus) feminea sessili, et alterâ pedicellatâ masculâ, utrâque biflorâ.

♂ *Gluma* bivalvis, subæquivalvis, nervosa, herbacea; *flosculo* utroque bivalvi, membranaceo.

♀ *Gluma* bivalvis; *valvula exterior* dimidio inferiore cartilagineo pedicellum locustæ masculæ amplectens, margine altero equitante, superiore compresso semiherbaceo nervoso; *interior* membranacea, acuminata. *Flosculus inferior* univalvis, neuter, glumæ interiori analogus; *superior* femineus, bivalvis, valvis angustatis acutis, stylo bifido, stigmatibus hispidulis.

Gramen *glabrum; culmo ramoso, geniculato; foliis planis; ligulâ brevissimâ, ciliatâ.* Affinitate proxima *Coici arundinaceæ*, Willd., quæ genus proprium (CHIONACHNE) efformat, a *Coice* diversum defectu veri involucri osseo-cartilaginei; in hâc plantâ enim involucrum auctorum gluma inferior locustæ femineæ est, ut in *Sclerachne*, a quâ *Chionachne* distinguitur præsertim figurâ et texturâ uniformi glumæ inferioris locustæ femineæ, et insuper spicâ locustis masculis pluribus, nec unicâ, etiam habitu. R. BR.

SCLERACHNE *punctata*, R. Br.

DESCR. Gramen (in exemplaribus Herbarii) bipedale, (verosimiliter tamen altitudinem multo majorem attingens,) basi decumbens. Radix fibrosa; fibris crassiusculis 2—3-pollicaribus; radiculis gracilibus ramosis. Culmi plures, geniculatim flexuosi, glabri, angulato-striati, ramosi; ramis e quovis articulo subbinis. Internodium inferius 3—4-pollicare, crassitie pennæ gallinaceæ; superiora 4—10-pollicaria, graciliora, demùm ferè capillaria; sub nodis impressis sericeo-pubescentibus paulùm incrassata. Folia angusto-lineari-lanceolata, acuta, inferiora sesquipedalia, superiora 3—9-pollicaria; vaginis 4—6-pollicaribus, ad basin usque fissis, nervoso striatis, pilis

simplicibus quibusdam e basi glandulosâ ortis conspersis; ligulâ brevissimâ, truncatâ, ciliatâ; laminâ planâ, margine minutissimè denticulatâ et ciliolatâ. Spicæ axillares, fasciculatæ, binæ, ternæ vel quaternæ, pedicellis brevibus insistentes. Ad basin cujusvis pedicelli involucrum monophyllum, foliaceum, foliorum vaginis simillimum, ferè pollicare, ad basin usque fissum, margine ciliolatum, apiculo plerumque brevi, quandoque tamen elongato, foliorumque laminam plùs minùs abbreviatam et ligulâ ciliatâ instructam emulante. Pedicelli semipollicares vel pollicares, striati, glaberrimi, apice incrassato intùs cavi. Spica androgyna, e locustis duâbus (raró tribus) bifloris; locustâ inferiore (vel duâbus inferioribus) femineâ, superiore masculâ. Locustæ femineæ gluma exterior oblonga, obtusa, convoluta, marginibus incumbentibus pedicellum locustæ masculæ amplectens; infernè cartilaginea, punctato-aspera; supernè compressa, aperta, semi-herbacea, nervosa. Intra basin glumæ exterioris cavitas magna cavitati apicis pedicelli respondens, per cujus medium transit locustæ femineæ pedicellus proprius a cavitatis parietibus omninò liber, basi articulatus, et maturus cum locustâ masculâ sponte solubilis. Gluma interior longitudine ferè exterioris, subcartilaginea, glabra, nitida, marginibus membranaceis inflexis florem neutrum amplectens, e basi ovatâ longè acuminata, 11-nervis, nervis lateralibus cum mediano ante apicem arcuatim anastomosantibus, mediano basi subcarinato. Flosculus exterior neuter, univalvis; valvulâ subcartilagineâ, nitidâ, similiter e latâ basi acuminatâ, 3-nervi, glumâ interiore pauló minore. Flosculus femineus bivalvis; valvulis angusto-lineari-lanceolatis, hyalinis; exteriore 1-nervi, interiore binervi: stamina vel squamulæ nullæ: caryopsis cartilaginea, subglobosa, altero latere (valvulam perianthii exteriorem glumamque internam spectante) latè et profundè sulcata, ferrum equinum quodammodo referens; embryo in sulci fundo, plumulâ subcylindricâ, basi acutâ, dimidium seminis longitudine superante. Locustæ masculæ pedicellus ex articulo racheos inter locustæ femineæ glumæ exterioris margines ortum ducens, et ab illis omninò inclusus, duas circiter lineas longus, infra medium (dum locusta feminea solitaria) pedicello brevissimo floris abortivi (cujus rudimenta minuta quandoque conspicua) instructus, apice incrassato cavus. Locusta mascula solitaria, biflora: glumæ herbaceæ, nervoso-striatæ, ovato-lanceolatæ, acutæ; exterior 11-nervis; interior quoque 11-nervis, nervis lateralibus cum mediano infra apicem arcuatim anastomosantibus. Flosculus uterque masculus bivalvis, valvulis membranaceis: inferior pauló major, valvulâ exteriore ovato-lanceolatâ acutâ trinervi, interiore binervi nervis dilatato-subcarinatis; squamulæ 2, subcarnosæ, obovatæ, obtusæ; filamenta 3: flosculus superior simillimus, sed minor; valvulæ tenuiores, exterior sub-1-nervis, interior 2-nervis, nervis minùs conspicuis; squamulæ et filamenta simillima.

This and the following grass were selected by Mr. Brown to illustrate the close affinity subsisting between *Coix* and *Tripsacum*, marking as they do two of the stages in the very gradual transition from the one to the other. That this affinity should so long have escaped the attention of botanists can only be accounted for by their having very generally mistaken the position of both; no one appearing to have suspected that *Coix* belonged to Mr. Brown's great division of *Paniceæ*, and M. Kunth alone having, as far as I am aware, admitted *Tripsacum* into a tribe forming part of that strongly marked and truly natural section. It is probably owing to the want of due attention to the very striking and important character by which the *Paniceæ* are connected together that this mistake of natural affinities has taken place among those who have aimed at a natural arrangement of grasses; while among those who have adopted a more or less artificial system, the monoicous structure of the two genera has on the contrary led to their near approximation.

A striking instance of the distance to which these nearly related genera have been separated is furnished by M. Kunth, in both of whose arrangements of grasses they are placed nearly at opposite extremities of the system. In the "Graminum Dispositio Naturalis*," *Tripsacum* is arranged in the restricted tribe of *Paniceæ*, and *Coix* among the "*Gramina Olyrea*;" while in the "Agrostographia Synoptica" (in which *Olyra* is brought into close approximation with *Panicum*, after the example of M. Trinius†) *Tripsacum*‡ is referred to the newly formed tribe of *Rottboelliaceæ*, and *Coix*§ forms part of that of *Phalarideæ*; the latter, it may be observed, containing, as there circumscribed, many genera that have little relation to each other. It would be difficult indeed to conjecture how *Coix* found its way into such company, were it not for the observation subjoined to the generic character, in which it is stated to be related to *Cornucopiæ*. Both these genera, it is true, are remarkable for their involucra, but for involucra of very different form and texture: in every other respect no two grasses can be more widely distant, *Cornucopiæ* being, as M. Kunth‖ justly states, "*Alopecuro proximum*," and indeed scarcely differing from that genus except in its curious involucrum and capitate inflorescence.

The passage between *Coix* and *Tripsacum* established by the genera *Chionachne*, *Sclerachne* and *Polytoca*, when once pointed out, is too evident to be mistaken. *Coix*, as Mr. Brown has observed above, differs from all the rest in its osseous involucrum, which is entirely closed except at the summit, where it is perforated for the passage of the pedicellus of the male spike. This involucrum is an organ altogether distinct from the envelopes of the female locusta, which exist in their proper number and position within it, and consist of a bivalvular gluma, a single-valved neuter floret within the outer valve of the gluma, and a bivalvular female flower within the inner¶. The Paniceous structure is here manifest; and it is confirmed, were confirmation necessary in so evident a case, by the position of the embryo at the bottom of the deep sulcus** on the outer side of the grain, or that side which corresponds with the outer valve of the female flower and with the inner valve of the gluma. From the same joint of the rachis with the female locusta, and inclosed like it within the involucrum, arise the pedicels of two abortive lateral locustæ, sometimes surmounted by short and imperfect rudiments of valves. Each joint of the male rachis in like manner bears three locustæ; but in this case the middle one of the three is pedicelled, while the two lateral are sessile, and they all equally bear two perfect bivalvular triandrous male flowers, inclosed within a 2-valved gluma. There exists, however, in *Coix* one organ, of which I do not exactly comprehend the value. This consists of a flat, linear, transparent, membranous lamina, with two strong nerves equidistant from its axis, seated between the pedicellus of the male spike and the pedicelli of the two abortive florets inclosed within the bony involucrum. This part has been overlooked by most authors, but has not escaped the minute accuracy of Schkuhr††, and is noticed also by M. Raspail‡‡. It bears, as far as I can perceive, no evident relation to any of the locustæ; and no analogous organ occurs in any of the related genera.

We next pass to *Chionachne*; the differences between which and *Coix* on the one hand, and *Sclerachne* on the other, are stated by Mr. Brown in the observation appended to the generic character at the head of the present article. So near is the relation between *Chionachne* and *Coix* that both Willdenow and Roxburgh have described the former without suggesting a doubt of its belonging to the same genus with the latter. The curious remark however, made by Mr. Brown, that the so-called involucrum of *Chionachne* has an origin totally different from

---

* *Mémoires du Muséum*, 2. p. 71—75. † Diss. II. p. 55 & 249. ‡ p. 468.

§ p. 20. ‖ p. 21.

¶ M. Nees von Esenbeck (in his "*Agrostographia Brasiliensis*," p. 310.) describes the inferior flower as "fœmineus bivalvis," and the superior as "neuter univalvis;" but their true position is certainly the reverse.

** It is curious that M. Raspail (*Ann. des Sci. Nat.* 5. p. 310.) should describe the grain of *Coix*, which has, when ripe, the broadest and deepest sulcus of any grain with which I am acquainted, as "*non* sulcatum." The sulcus in this and the related genera is external instead of internal, as in most grasses with sulcated grains; and M. Kunth's character of the caryopsis, (*Agrost. Synopt.* 1. p. 20.) "*internè* sulco lato exarata," must therefore have reference to the axis of the spike, and not to that of the locusta or of the female flower.

†† *Botanisches Handbuch*, iii. p. 226. t. 285. *p*. ‡‡ *Ann. des Sci. Nat.* v. p. 309.

that of *Coix*, being in reality the outer valve of the gluma of the female locusta, at once establishes a striking difference between the two. Its surface is smooth, shining and of a cartilaginous texture, resembling the involucrum of *Coix*, but its margins are not united, and the pedicellus of the male spike passes between them without being entirely hidden; there are no pedicels of abortive flowers on the same joint with the female locusta; and each joint of the male rachis has also but a single locusta, which, like the male locustæ of *Coix*, is furnished with a 2-valved gluma, and contains two bivalvular triandrous male flowers. The true involucrum, in this genus as in *Sclerachne*, is foliaceous, open in its whole length, and attached to the base of the pedicellus of the spike. As the name of *Coix arundinacea* applied by Willdenow to the species which forms the type of this genus, is posterior by many years to the application by Lamarck* of the same name to a grass, which appears to be very nearly related to *Coix Lachryma*, it may perhaps be advisable to substitute for it Roxburgh's specific name of *barbata*. The outer valve of the female locusta of *Chionachne* is well described by the last-named botanist†, but with the mistaken notion that it constituted a true involucrum.

In *Sclerachne* this outer valve, cartilaginous and covered with rough points in its lower half, in its upper gradually becomes semi-herbaceous; its margins overlap without uniting; and the male pedicellus is inclosed within them. There are no abortive pedicelli arising from the same joint; but the second joint of the rachis occasionally bears a second female locusta, of which most commonly only the imperfect rudiments are to be observed; and the third, which is furnished with a single male locusta, similar in all its essential characters to those of *Coix* and *Chionachne*, terminates the axis of the spike. A remarkable coincidence is observable between the inner valves of the glumæ of the male and female locustæ, in the arched anastomosis formed by each of the lateral nerves with the median some distance below its apex; a structure which I do not remember to have seen so strongly marked in any other grass. The grain bears a striking resemblance to that of *Coix*, having the same broad and deep external sulcus, with the embryo lodged in the bottom of the concavity.

We have seen in *Sclerachne* the spike reduced to a single male, and a single female, locusta: in *Polytoca* on the other hand the number of female locustæ at the base of the axillary spikes is greatly increased, and the males also become more numerous than in any of the preceding genera, while the terminal spikes produce the latter only. It has just been observed that two female locustæ are occasionally developed in *Sclerachne*; and I have met with the same anomaly in a single instance in a specimen of *Coix Lachryma*. But in the androgynous spikes of *Polytoca* the production of female flowers is continued through the lower half of the closely imbricated rachis; the outer gluma of the female locusta assuming a somewhat more herbaceous appearance than in *Sclerachne*, and the locusta itself being partly lodged in a depression of the slightly thickened rachis. The joints of the rachis, both male and female, are each furnished with two locustæ. In the male these are nearly similar in every respect except that the one is sessile at the base of the joint, and the other raised on an adnate pedicellus nearly to its apex: each has a bivalvular gluma including two bivalvular triandrous male florets, nearly resembling those of the preceding genera. In the fertile joints the lower and sessile locusta alone is female, the upper being reduced to a single broad foliaceous valve, assuming the form and office of a bractea with reference to the locusta at the base of the next succeeding joint. The characters given by Roxburgh‡ of his *Coix heteroclita* agree generally with those of *Polytoca*, with which Mr. Brown has pointed out its near relation; and its reference to the genus *Coix* shows that Roxburgh was sensible of its true affinity, of which, on a comparison of its structure with that of *Chionachne* and *Sclerachne*, not a doubt can be entertained.

The affinity of *Polytoca* to *Tripsacum* is manifest at a single glance; the chief distinctions between them consisting in the greater development of the rachis of the latter; its deeper excavation for the lodgment both of the male and female locustæ; the entire suppression (frequent but not constant) of the neutral locusta in the fertile joints of the rachis; and the collateral position of the two male locustæ at the base of the joints supporting them. The neuter floret in the fertile locusta of *Tripsacum* also acquires a second valve.

---

* *Encyclopédie Méthodique*, iii. p. 422. † *Flora Indica*, iii. p. 569. ‡ *Ibid.*, iii. p. 572.

On a review of these genera it is curious to note the various organs which in one or other of them acquire, during their progress to maturity, an extraordinary enlargement and induration of their tissue. This change in *Coix* takes place in the involucrum; in *Chionachne* and *Sclerachne* in the outer valve of the gluma of the female locusta; and in *Tripsacum* in the rachis of the spike. In *Zea Mays* (which is also a nearly related grass, being manifestly allied to *Polytoca*; and one whose Paniceous character is so obvious that it is surprising that it should not long ago have assumed its proper station in that tribe) it would appear as though this tendency to enlargement by the production of indurated tissue were transferred to the grain itself. In all essential characters this grain bears a close resemblance to those of *Coix* and *Sclerachne*, the upper or embryoniferous side being, however, much less deeply sulcated, or rather presenting only a broad and superficial depression.

Dr. Horsfield has "but a single locality for this grass, namely the village of Jebus, near the capital of Surakerta: here," he says, "I found it along hedges, but it is by no means abundant." I. J. B.

Tab. IV. *Fig.* 1. *Sclerachne punctata*, of the natural size. *Fig.* 2. A spike, magnified, seen from without. *Fig.* 3. The same, seen from within. *Fig.* 4. The male locusta, with its pedicellus. *Fig.* 5. Valves of the male perianthium. *Fig.* 6. The female locusta, seen from within, the outer valve of the gluma being removed. *Fig.* 7. The same, seen from without. *Fig.* 8. The same, with the neuter floret and inner valve of the female perianthium turned back. *Fig.* 9. The grain, seen from within as regards the axis of the spike, from without as regards its position in the locusta. *Fig.* 10. The same, more highly magnified, with the pericarp and membranes dissected, showing the embryo lodged in the bottom of the sulcus.

POLYTOCA BRACTEATA.

TAB. V.

POLYTOCA.

CHAR. GEN. *Spicæ terminales* masculæ; *axillares* androgynæ, infrà femineæ; utriusque rachi ad articulos singulos bifloros solubili. *Locustæ masculæ* biflore, biglumes; stamina 3; squamulæ hypogynæ 2. *Locusta feminea* biflora, biglumis: *Glumæ valvula exterior* cartilaginea, rachin angustam amplectens, nervosa, alata; *interior* lævis, acuminata: *flosculus exterior* univalvis, neuter, glumæ interiori analogus; *interior* femineus, bivalvis, lodiculâ nullâ. Gramen *elatum: foliis planis, margine asperis; ligulâ brevi, ciliatâ.* Articuli feminei spicæ androgynæ *locustâ neutrâ, univalvi, herbaceâ, articulum amplectente, stipati.* Locustæ masculæ flosculus superior *paulò præcocior.* Stigmata *longissima, colorata.* Affinitate hinc *Tripsaco*, inde *Chionachni.* An hujus generis, vel forsan generis distincti valde approximati, *Coix heteroclita*, Roxb. Fl. Ind. 3. p. 572. R. BR.

POLYTOCA *bracteata*, R. BR.

DESCR. Gramen elatum; culmi summitatibus pro Herbario lectis plùs quàm bipedalibus, erectis, rigidis, semiteretibus, altero latere planiusculis, glaberrimis, nitidis. Internodia 6—9-pollicaria, semi-exserta; nodis discoloribus, impressis, sericeo-pubescentibus. Foliorum vaginæ glabræ, nervoso-striatæ, ad basin usque fissæ, arctè convolutæ; ligulâ brevissimâ, eroso-ciliatâ; laminâ juxta ligulam coarctatâ, dein lineari-lanceolatâ, acutâ, in superiore culmi parte pedali, basin rotundatam versus pollicem ferè latâ, nervo medio crassiusculo subtùs prominente venisque lateralibus utrinque circiter 4 instructâ, margine antrorsùm argutè denticulatâ. Spicæ tripollicares, imbricatæ; axillares solitariæ, involucratæ, androgynæ, dimidio inferiore femineæ, superiore masculæ; terminales ternæ, nudæ, masculæ, duàbus inferioribus retrofractis ad basin usque floriferis, summâ breviter pedunculatâ erectâ. Spicarum axillarium involucra intra foliorum vaginas, iisque simillima, acuta, quandoque mucrone foliaceo brevi foliorum laminas emulante apiculata; interdum bina vel terna. Rachis sericeo-pubescens, striata; articulis supernè crassioribus, apice cavis, bifloris. In articulis inferioribus

Tab. V.



POLYTOCA BRACTEATA.

spicæ androgynæ, locustæ feminea et neutra : feminea sessilis in articuli basi, biglumis, biflora ; glumæ valvulâ exteriore oblongâ, subcartilagineâ, obtusâ, obsoletè bidentatâ, dimidio inferiore sericeo-pubescente, ad latus utrinque barbato, multinervi, marginibus inflexis, dimidio superiore glaberrimo, nitido, lateribus extra margines proprios utrinque alatim dilatatis, minutissimè ciliolatis ; valvulâ interiore e basi ovatâ longè acuminatâ, glaberrimâ, nitidâ, 11-nervi, marginibus inflexis: flosculus inferior neuter, univalvis ; valvulâ glumæ interiori simillimâ, paulò tamen minore, et paulò minùs acuminatâ: flosculus superior femineus ; valvulis hyalinis, lanceolatis, acutis, exteriore 3-nervi, interiore binervi ; ovario oblongo, stylo filiformi valvulis breviore, stigmatibus longissimis, atro-purpureis, densissimè distichè plumosis. Locusta neutra prope apicem articuli (pedicello adnato) subsessilis, univalvis ; valvulâ locustam femineam articuli proximè sequentis veluti bracteâ subtendente, obliquè lanceolatâ, acutâ, herbaceâ, nervosâ, multinervi, minutissimè ciliolatâ, versus apicem in nervo medio callo lineari dorsali notatâ, juxta nervum alterius lateris reliquis crassiorem alâ angustissimâ membranaceâ (valvulæ margine proprio) intùs instructâ. In articulis superioribus spicæ androgynæ, ut in spicâ masculâ, locustæ masculæ in quovis articulo binæ ; inferior ad articuli basin sessilis, superior (pedicello adnato) prope apicem subsessilis, utraque biglumis, biflora : gluma exterior herbacea, oblonga, planiuscula, nervis 9 exarata, in locustâ inferiore latere utroque, in superiore altero latere tantùm, extra margines proprios inflexos dilatata, margine sub lente denticulato-ciliolata ; gluma interior membranacea, nitida, lanceolata, acuta, 7-nervis, marginibus inflexis : flosculus uterque masculus, triandrus, bivalvis, valvulis membranaceis, nitidis ; inferioris valvulâ exteriore ovato-lanceolatâ, acutâ, 3-nervi, marginibus inflexis ; interiore ejusdem ferè formæ, binervi, ad margines inflexos subbicarinatâ ; squamulæ hypogynæ 2, obovato-oblongæ, truncatæ, carnosæ ; flosculi superioris valvulæ tenuiores, nervis minùs conspicuis instructæ, marginibus minùs inflexis, squamulæ et stamina simillima.

One of the most striking peculiarities in the appearance of the present grass consists in the manner in which the pedicellate or neutral locusta of each of the fertile joints of the rachis (becoming foliaceous, and having its pedicellus attached for nearly its whole length) forms as it were a bractea subtending the female locusta at the base of the next succeeding joint ; but a similar structure, in all essential points, although less obvious on account of the smaller comparative development of the parts, is met with in other genera. Of this *Rottboellia* affords a good and ready instance ; the pedicellus being, in the typical species of that genus, equally adnate ; and its neutral locusta, reduced to two or three empty valves, occupying the same position with reference to the succeeding joint as in the genus under consideration.

From *Tripsacum* to *Rottboellia*, it may here be observed, the transition is easy. A fertile joint of the rachis of *Rottboellia* placed side by side with a fertile joint of that of *Tripsacum* exhibits little essential difference except in the very general want of the second locusta in the latter; but its occasional presence, either in the male or neutral state, reduces the absolute difference between the two genera to the more perfect condition of the biflorous male locustæ of the upper part of the spike in *Tripsacum*, their collateral position and equal development, and the circumstance of the fertile floret being merely female ; while in *Rottboellia* the second locusta of each joint is always neuter and supported by an adnate pedicellus ; and the sessile locusta becomes gradually less perfect as we approach the summit of the spike; its upper floret being hermaphrodite in the lowermost joints, male in the intermediate, and neutral in those of the extremity.

In that article reference has been made to the wide separation established by botanists between *Tripsacum* and *Coix* ; but it ought to be observed that Linnæus is not of the number of those who have neglected the affinity subsisting between them. So evident indeed was their relation to his mind, that for a long time he actually

referred them both to the same genus, and it was not until the tenth edition of his "Systema Naturæ" that he ventured to separate *Tripsacum* as distinct.

Polytoca bracteata was found by Dr. Horsfield "in 1809, on the Prowoto Hills; a calcareous range, commencing about 20 miles south of Semarang, extending parallel to the sea-coast nearly 50 miles to the eastward, and rising to the elevation of about 1000 feet. On this range the grass is scattered in solitary clusters among shrubs and trees. I never noticed it," Dr. Horsfield adds, "in any other part of Java. Its native name is *Tuton*."

I. J. B.

Tab. V. *Fig.* 1. The upper part of the culm of *Polytoca bracteata*, of the natural size. *Fig.* 2. One of the lower, or sessile, male locustæ, magnified, seen from within. *Fig.* 3. The same, more enlarged, seen laterally, and with the valves separated, to show the two male florets. *Fig.* 4. Its hypogynous scales. *Fig.* 5. Portions of two successive fertile joints of the androgynous spike, magnified, showing the univalvular neutral locusta seated on its adnate pedicellus near the apex of one, and the female locusta inserted at the base of the other: the female locusta at the base of the lower, and the neutral at the apex of the upper, are removed. *Fig.* 6. The female locusta, more enlarged, seen from within. *Fig.* 7. The inner valve of its gluma separated. *Fig.* 8. Its univalvular neuter floret. *Fig.* 9. Its bivalvular female floret.



LEPTASPIS URCEOLATA

LEPTASPIS URCEOLATA, *R. B*

TAB. VI.

Leptaspis *urceolata*, foliis oblongis acuminatis, spicis plurimis simpliciusculis fasciculatim digitatis multifloris, perianthio fructifero undique pubescente; valvulis basi connatis.

Leptaspis alt. spec., *R. Br. Prod. Fl. Nov. Holl. p.* 211.
Pharus urceolatus, *Roxb. Fl. Ind.* 3. *p.* 611.

Descr. Gramen sesquipedale. Rhizoma crassum, e vaginis emarcidis radices crassiusculas 4—6-pollicares, sulcato-angulatas, apicem versus fibrillosas, dimittens. Culmus erectus, striatus, infernè glaber, supernè pubescentiâ brevi vestitus, foliorum vaginis totus obvolutus; internodio supremo demùm elongato, vaginamque folii superioris multò superante. Foliorum vaginæ 3—6-pollicares, convolutæ, usque ad basin apertæ, striatæ, glabræ, margine membranaceæ, collo barbatæ. Ligula nulla nisi barba brevissima setosa colli. Petiolus pollicaris, externè striatus, interstitiis striarum minutè puberulis, internè sulco lato marginibus elevatis exaratus, apice tortus. Folia 5—7 pollices longa, sesqui-pollicem ad 2 pollices lata, elongato-oblonga, acuminata, extùs parùm latiora, exactè disticha, pedicelli torsione adversa, glaberrima; nervo medio subtùs prominente, suprà complanato pallido; venis primariis longitudinalibus numerosissimis a transversis rectangulis brevissimis pulchrè reticulatim connexis, longitudinalium utrinque circiter 5 paulò crassioribus. Panicula terminalis, digitatim 8—12-radiata; radiis 4—6 pollices longis, subfastigiatis, pubescentibus, striatis, infernè breviter ramosis, supernè simplicibus. Ramuli plerumque locustam unicam femineam, inferiores tamen quandoque duas, tres vel quatuor gerentes, masculâ unicâ semper terminati; radiorum apicibus similiter femineas laterales plures masculamque terminalem unicam gerentibus. Locustæ masculæ glabræ, cum pedicello apicem versus parùm incrassato articulatæ: gluma membranacea, caduca; valvulâ inferiore lanceolatâ; superiore paulò longiore, ovatâ, obtusâ: perianthium membranaceum, glumâ superiore plùs duplò longius; valvulâ inferiore convolutâ, latè ovatâ; superiore lineari, binervi, apice subemarginatâ, inferiorem paulò superante; stamina 6; antheræ lineares; squamulæ nullæ. Locustæ femineæ cum pedicello brevi apice incrassato articulatæ: gluma texturæ quam in masculo paulò firmioris, pubescentula, caduca; valvulâ inferiore ovato-lanceolatâ, 5—7-nervi; superiore latè ovatâ, 9-nervi, marginibus inflexis: perianthium bivalve; valvulâ inferiore coriaceâ, undique pubescente, 9-costatâ, marginibus incrassatis cohærente in urce-

olum ventricosum, obovatum, demùm subglobosum, chartaceum, undique clausum, nisi in apice aperturâ angustissimâ perforato ; valvulâ superiore membranaceâ, planâ, lineari, binervi, bidentatâ, basi cum valvulæ inferioris suturâ incrassatâ connatâ, apice plerumque per foramen ejus apicale unà cum stylo exsertâ; squamulæ vel stamina nulla; ovarium ovatum, supernè glabrum ; stylus simplex, planiusculus, longitudine valvulæ inferioris perianthii, fasciculis 3 vasculosis in stigmata totidem longiuscula, exserta, divaricata, plumosa, desinentibus.

Pubescentia tota, sicut et in *Pharo*, e pilis brevibus, simplicibus, apice uncinulatis.

In establishing the genus *Leptaspis*, on a New Holland species, found at Endeavour River by Sir Joseph Banks, Mr. Brown observed : "facies et inflorescentia Phari latifolii, L. a quo solummodo propter valvulam exteriorem perianthii peculiarem separavi; an recte ?" Relying probably on the doubt thus expressed, M. Trinius *, who had no knowledge of either of the species on which the genus was founded, and who evidently misunderstood the generic character, referred them without hesitation to the genus *Pharus*. In this he was followed by M. Raspail †, whose generic character, however, excludes *Leptaspis*; and by Sprengel, who in his "Systema‡" omits all notice of the difference of structure in the outer valve of the female perianthium, while in his "Genera" even the name of *Leptaspis* is not to be found. Even M. Kunth, who adopts the genus and its character, appears to have mistaken the latter, for in his specific difference he has altered "perianthii fructiferi costis," into "palearum fructiferarum costis," thus giving quite a different idea of the structure from that which really exists.

The difference in structure between the two genera is, however, as obvious as it is remarkable. In *Pharus* the elongated and thickened outer valve of the female perianthium is merely convoluted at its edges, which have no cohesion between themselves ; while in *Leptaspis* the edges cohere by a thickened suture, and the outer valve forms an almost globular ventricose sack, furnished only with a narrow opening at the apex, through which the exserted stigmata protrude. In the structure of the included inner valve there is a slight difference between the two species; that of *L. Banksii* being free as in *Pharus*, but greatly reduced in size ; while that of *L. urceolata*, which, as in *Pharus*, equals the outer in length, is slightly coherent in the flowering state, and in the fructiferous firmly united, at its base, to the inner surface of the suture of the latter. There is thus established a kind of gradation in the extent to which the union of these parts is carried. The margins of the outer valve, entirely free in *Pharus*, coalesce in *Leptaspis Banksii*; and to this coalition is superadded, in *L. urceolata*, the coherence of nearly half the entire length of the inner valve with the margins of the outer.

It may deserve mention, as a curious instance of facility in copying, that a typographical error in the original character of the genus *Leptaspis*, attributing to its *male* flower "stamina 0," instead of "stamina 6," was repeated by M. Palisot de Beauvais §, (who adopted the genus,) without note or comment on so marvellous a peculiarity. The error has been corrected by Mr. Brown in M. Nees von Esenbeck's edition of the "Prodromus Floræ Novæ Hollandiæ," and in many of the copies of the original. It is singular that while he passed over this obvious misprint, M. Palisot placed the not unfrequent character of "squamulæ nullæ" within brackets, as requiring, in his opinion, further investigation.

Leptaspis urceolata was found by Dr. Horsfield "in 1809, in Padjittan, one of the middle districts belonging to the Native Princes' Territory, near the village Kalak, about 10 miles from the southern shore of the island. Here it grows abundantly in a shaded situation, in a rich black mould, about 500 feet above the level of the sea. I never noticed it," Dr. Horsfield adds, "in any other part of the island." I. J. B.

TAB. VI. *Fig.* 1. The upper part of the culm of *Leptaspis urceolata*, of the natural size. *Fig.* 2. Terminal

* *Fundamenta Agrostographiæ*, p. 204 ; where "valvula inferior—apice angustata" is substituted for "aperturâ apicis angustatâ."

† *Ann. des Sci. Nat.* v. p. 305 and 455.

‡ ii. p. 114.

§ *Agrostographie*, p. 126.

portion of a branch of the inflorescence, bearing a female flower below, and a male flower above. *Fig.* 3. A male flower with its valves separated. *Fig.* 4. A female flower, with the valves of the gluma removed, showing the form of the enlarged perianthium, the suture uniting the edges of its outer valve, and the tip of the inner valve projecting through the perforation of the apex. *Fig.* 5. A portion of the female perianthium seen from within, *showing* the inner valve attached for nearly half its length to the suture uniting the edges of the outer: the pistillum is removed. *Fig.* 6. The female organs with all the valves removed. *Fig.* 7. A portion of the surface of the female perianthium, highly magnified, to show the character of the pubescence.

HEXAMERIA DISTICHA.

TAB. VII.

Hexameria.

Chiloglottis v. Appendicula, *Blume Bijdr.* p. 296-7, ad Malaxideas pertinens.

Char. Gen. *Perianthium* erectiusculum, sepalis lateralibus exteriorum basi connatis et infrà productis in saccum maximum calcar obtusum emulantem. *Labellum* e basi calcaris ortum, unguiculatum; laminâ supernè indivisâ, basi bisetâ. *Columna* brevissima. *Anthera* (filamento insidens) stigmati bilobo parallela, bilocularis. *Massæ pollinis* cereaceæ, in singulo loculo tres(!), quarum duæ inferiores collaterales, tertia superior, omnes apice acuto affixæ corpusculo septiformi loculum longitudinaliter bipartienti et cum eodem deciduæ.

Epiphyta *nana*; caule *ramoso*; foliis *distichis, mucronatis, basi in petiolum brevem semivaginantem attenuatis*; racemis *terminalibus, paucifloris.*

Obs. *Hexameria* proxima *Chiloglottidi* esse videtur, forsanque ab ipsâ *Chiloglottidi serpyllifolia*, Bl. haud diversa; et si in hâc necnon in *Appendiculis* omnibus septa mobilia decidua loculos antheræ bipartientia et massas pollinis affigentia exstant hæc tria genera conjungi merentur. Numerus ternarius enim massarum, quamvis characterem insignem, et in *Hexameriâ distichâ* constantem, præbens, minoris certè valoris considerari debet. R. Br.

Hexameria *disticha*, R. Br.

Herba parvula, inter muscos parasitica, rhizomate gracili filiformi repens. Caules hic illic e rhizomate orti, erectiusculi, filiformes, tenues, 3—6-pollicares, ramosi, a basi ad apicem usque foliorum vaginis tecti. Folia numerosa, disticha, equitantia, patentia, 2—3 lineas longa, oblongo-lanceolata, mucronata, glabra, nervoso-striata, basi cum vaginâ articulata, demùm soluta et caduca. Spicæ terminales, paucifloræ, e floribus scilicet 3 vel 4. Flores parvi, pedicellis patentibus suffulti,



HEXAMERIA DISTICHA.

singuli bracteâ parvulâ membranaceâ, ovatâ, deflexâ, pedicellum subtendente, instructi. Perianthii foliola 6, biserialia: exteriora subæqualia, basi connata, latè ovata, obtusiuscula, nervo medio subcarinata; anticum (ovario recto persistente directionem suam primitivam servans) paulò angustius; lateralia basi superiore connata in saccum maximum obtusum, subdidymum, floris limbum explicatum plusquàm duplò superantem, et calcar emulantem: interiorum lateralia exterioribus paulò breviora, oblongo-linearia, obtusiuscula; posticum (labellum) inclusum, e fundo calcaris ortum, unguiculatum, laminâ angustè obovatâ, trinervi, integerrimâ, unguem linearem bis superante, basi utrinque in setam gracilem, unguis longitudine, abeunte. Columna brevis: stigmatis lobis lateralibus auriculas breves subrotundas (in sicco) emulantibus; antico profundè bifido, laciniis lanceolatis acutis. Anthera stigmati parallela, filamento brevi filiformi affixa, ovata, apice emarginata, basi cordata, bilocularis, loculis approximatis. Massæ pollinis 3 in quovis loculo, cereaceæ, lanceolatæ, septo membranaceo, lanceolato, loculum longitudinaliter bipartienti, demùm soluto et cum massis deciduo, apicibus acutis affixæ; duæ inferiores collaterales ad utrumque septi latus; tertia superior, paulò minor et gracilior, ad ejus latus externum. Massæ superioris respondentis ad septi latus internum vestigia nulla. Caudicula nulla.

Dr. Horsfield "found this minute plant, in the year 1817, on the declivities of one of the principal volcanoes of the western part of Java, the mountain Gede, situated about 40 miles south of Batavia, in the rich vegetable mould covering the rocks. It appears to be peculiar to the western portion of the island."

Its characters, as above given, evidently prove it to belong to Professor Lindley's tribe of *Malaxideæ*, and to that section of it to which he has given the name of *Dendrobieæ*. I. J. B.

Tab. VII. *Fig.* 1. *Hexameria disticha*, of the natural size. *Fig.* 2. The terminal portion of one of its branches, slightly magnified. *Fig.* 3. One of the flowers separated, and more highly magnified. *Fig.* 4. The same, slit open along the line of connection of the two lateral outer sepals, with the labellum drawn out to exhibit its structure. *Fig.* 5. A flower with the sepals turned back, to show the anther and the lobes of the stigma. *Fig.* 6. The anther separated, showing in one of its cells the moveable septum and the three pollen masses: the masses have been removed from the cavity of the other cell, and are seen separate at *Fig.* 7.

PHALÆNOPSIS AMABILIS, Bl.

TAB. VIII.

PHALÆNOPSIS, *Blume Bijdr.* p. 294. *Lindl. Orchid.* p. 213.

VANDEÆ, *Lindl. Orchid.*

CHAR. GEN. *Perianthium* explanatum, 5-partitum. *Labellum* ecalcaratum, unguiculatum: *laminâ* tripartitâ: *lobo medio* hastato, apice laciniis duâbus elongatis subulatis, dente intermedio obsoleto. *Columna* libera, cum ungue labelli continua; apice obliquo trifido. *Anthera* bilocularis. *Massæ pollinis* cereaceæ, duæ (in singulo loculo singula), subglobosæ, singulæ ex apice depresso funiculum elasticum exserentes, ope cujus apici dilatato processûs e glandulâ stigmatis orti separatim affixæ.

Herba *arboribus innascens*; caule *abbreviato foliato haud dilatato*; foliis (2—4) *oblongis explanatis rigidis*; scapo *elongato*; racemo *laxo*; floribus *speciosis albis*; sepalis lateralibus interiorum *dilatatis*; labelli ungue *apice tuberculo aucto*, laminæ lobis lateralibus *unguiculatis*; columnæ laciniis lateralibus *deflexis, glandulam stigmatis ejusque processum tegentibus*. R. BR.

PHALÆNOPSIS *amabilis*, Blume Bijdr. p. 294. Lindl. Orchid. p. 213. *ex Blume. l. c.*
Angræcum album majus, *Rumph. Herb. Amb.* vi. p. 99, t. 43.
Epidendrum amabile, *L. Sp. Plant.* 1351. *Osbeck, Ostindisk Resa,* p. 271. *Swartz, in Nov. Act. Upsal.* vi. p. 67.
Cymbidium amabile, *Roxb. Fl. Ind.* iii. p. 457.

Herba parasitica. Radix e fibris plurimis, arborum ramos ambientibus, pollices plures longis, crassitudine pennæ anserinæ, teretiusculis, lævibus; texturâ laxè cellulosâ; chordâ vasculari centrali tenaci instructis. Caulis abbreviatus, vix pollicaris, vaginis foliorum equitantibus omninò tectus. Folia pauca (2—4), oblonga v. oblongo-lanceolata, 6—9 pollices longa, glabra, basi attenuata cum vaginâ brevi persistente articulata, caduca. Scapus (quandoque 2 ex eâdem radice) tripedalis v. altior, glaber, in parte inferiori bracteis parvis, amplexicaulibus, ovatis, alternis, 3—6 pollices ab invicem distantibus, munitus; supernè floriferus, simplex v. ramulo uno alterove instructus.



PHALÆNOPSIS AMABILIS

Racemus laxus; floribus pollices 2 vel 3 ab invicem distantibus. Bracteæ subtendentes parvæ, semiamplexicaules, ovatæ v. lanceolatæ. Pedicelli cum ovariis vix crassioribus sesquipollicem longi. Flores albi, speciosi, explanati tres circiter pollices in diametro. Sepala 3 exteriora subæqualia; supremum (propriè anticum) oblongo-ellipticum, obtusum; lateralia ovata, acutiuscula: interiorum lateralia majora, suborbiculata, brevissimè unguiculata. Labellum cum basi columnæ continuum; ungue lineari: laminâ tripartitâ; laciniis lateralibus obliquè obovatis, basi attenuatis; intermediâ lineari, hastatâ, lobis baseos subrectis lanceolatis, apice utrinque in setam subulatam, tortuosam, pollicarem v. sesquipollicarem productâ, dente intermedio obsoleto obtuso. Ad apicem unguis labelli, tuberculum suberectum, carnosum, luteolum, lateribus compressum, apice obliquè truncatum et profundè longitudinaliter bifidum. Columna longiuscula, apice obliquè truncata. Anthera opercularis, rostello ovato affixa, apice membranaceo ovato acuto glandulam stigmatis tegens, bilocularis, loculis approximatis. Massæ pollinis duæ subglobosæ, cereaceæ, simplices. Stigma trilobum; lobis lateralibus lanceolatis, deflexis, glandulam lobi medii magnam, ovatam, pariter deflexam, et processum ejus pollen affigentem linearem, infernè acutum, supernè subpeltato-dilatatum, margine interno tegentibus. Hujus processûs apici dilatato massæ pollinis demùm separatim affixæ, ope funiculi brevissimi elastici ex apice depresso cujusvis massæ orti.

This fine Orchideous plant was first noticed by Rumphius, whose figure affords, however, a very inadequate idea of its size, singularity and beauty. It was subsequently found by Osbeck, on his passage home from China, in 1752, near the watering-place on New Island, at the western extremity of Java; and was characterized by Linnæus, on the authority of Osbeck's specimens, in the following year, in the first edition of the "Species Plantarum." These specimens, consisting of two expanded flowers and two loose leaves, have been examined by Mr. Brown in the Linnean Herbarium, and leave no doubt of the identity of the plant described by Osbeck and Linnæus with that now figured. In 1798 it was introduced from the Moluccas into the Botanic Garden at Calcutta, where, according to Roxburgh, it flowered in March and April; but as it does not occur in Dr. Wallich's List, it is probable that it has since been lost to that establishment.

In his Memoir on the genus *Epidendrum* of Linnæus, Swartz notices the want of cohesion between the column and base of the labellum in the present species as distinguishing it from all the rest; and describes it as having "glandula magna bifida, ad basin laminæ [labelli] inserta, apice columnæ connexa antherasque tegens." It is probable that the singular structure of the tubercle surmounting the unguis of the labellum, somewhat imperfectly observed, may have been regarded by him as equivalent to the union of column and labellum occurring in the true *Epidendra*, and may have deterred him from attempting its separation, although fully aware that it did not technically correspond with his character of the genus. Roxburgh, however, who observed the plant in its living state, could not fail to be struck with its distinctness from *Epidendrum*, and accordingly transferred it to *Cymbidium*, to which it is certainly much more nearly related, and of which, according to the merely technical characters given by Swartz, it would necessarily form part. But the entire characters of the plant, and in particular those derived from its column and labellum, (both remarkable for the singularity of their structure), are amply sufficient to require its establishment as a distinct and strongly marked genus belonging to the tribe of *Vandeæ*.

Dr. Roxburgh adds to his description, that "the flowers of this charming species are very large, pure white, and fragrant." It is singular that Rumphius should speak of the flowers as wholly inodorous; for in addition to the statement of Roxburgh, we have the explicit and circumstantial testimony of Osbeck to their delightful fragrance. His account of it, adopting the language of Forster's translation of his Voyage, and omitting his very accurate description, is as follows: "*Epidendrum amabile* grew on the branches of trees on the shore. This

plant hath great, white, odoriferous flowers, such as I never observed before. I had this plant lying in my room for some days together; but the flowers did not wither, and filled it with the most agreeable smell. On the isle of Ternate none but princesses are allowed to wear this precious flower, which is but too scarce*."

However scarce in particular localities, the range of this beautiful plant seems to be rather extensive. Rumphius and Roxburgh speak of it as a native of the Moluccas, and it has been found at three widely distant points of the Southern side of the island of Java, all in the immediate vicinity of the coast. The place of growth mentioned by Osbeck, was on the shore of a small island near the western extremity of Java; Dr. Blume observed the plant in woods *near the coast* of Nusa Kambangan; and Dr. Horsfield had found it "in 1809, in one locality only in the district of Padjittan, in a low situation, near the southern coast of the island, and at no great distance from the ocean." I. J. B.

Tab. VIII. *Fig.* 1. *Phalænopsis amabilis*, with the scape divided into two portions, of the natural size. *Fig.* 2. The column and labellum, of the natural size; all the other parts of the flower being removed. *Fig.* 3. The anther separated and magnified, the pollen masses being left adhering to the process of the stigma. *Fig.* 4. The column, with the anther removed, showing its lateral deflected lobes turned back, the stigmatic gland with its strap-shaped process, and the pollen masses attached to the dilated apex of the latter. *Fig.* 5. The stigmatic process, and pollen masses, with the separate funiculi by which they are attached.

* Osbeck's Voyage, translated by Forster, vol. ii. p. 50.

Tab. II



FREYCINETIA GAUDICHAUDII.

TAB. IX.

FREYCINETIA, *Gaud. in Voy. de Freyc., Bot.*, p. 431. Conf. *R. Br. in loco infra citato.*

CHAR. GEN. *Flores* dioici, v. (antheris in spadice femineo cassis) pseudo-polygami. Masc. *Spadix* simplex. Fem. *Pericarpia* baccata, mollia, sæpiùs apicibus fibroso-lignosis in phalanges connata. *Semina* numerosissima, minuta, striata, altero latere strophiolo longitudinali instructa, biseriatim affixa placentis parietalibus tot quot lobi stigmatis. (*Char. quoad differentias magìs essentiales ex* R. Br. Prodr. Floræ Nov. Holl. p. 341.)
Caudex *arboreus, v. frutescens, plerùmque scandens, radicans.*

F. Gaudichaudii, pericarpiis omnibus æqualiter coalitis, stigmate 2—3-lobo, spadicibus femineis ovali-oblongis.

Frutex scandens, radicans. Caudices (ex Horsf.) plures, lignosi, teretes, supernè semunciam crassi, vaginis foliorum persistentibus penitùs obvoluti, hinc inde sub vaginarum ore aculeo brevi crasso obtuso uno alterove armati. Rami teretiusculi, foliorum vaginis imbricatis glaberrimis vestiti. Folia triseriata, patentia vel subreflexa, membranacea, lineari-lanceolata, glabra, nervoso-striata, nervis utrinque circiter 12, apicem versus carinâ parùm evolutâ marginibusque obsoletè cartilagineo-spinulosa, cum vaginis semuncialibus integris ore truncatis basi latâ semiamplexicauli quasi articulata. Flores dioici, in spadicibus terminalibus fasciculatis. Masc. spadix intra folium mutatum ovato-lanceolatum acuminatum basi incrassatum spathâ latiusculâ membranaceâ truncatâ instructus, pedunculo pollicari spatham duplò superante insistens, simplex, ovalis, 3—4 lineas longus, staminibus numerosissimis monantheris undique densissimè tectus. Perianthium nullum. Filamenta brevia, libera. Antheræ parvæ, ovatæ, dorso adnatæ, biloculares, longitudinaliter ad margines dehiscentes, valvulis revolutis capituli simplicis subglobosi speciem præbentes. Pollen minutum, subglobosum vel ellipticum, læve, hyalinum. Fem. spadix intra folia basi incrassata et paulo latiora, spathâ ovali involutus, pedunculo crasso pollicari insistens, ovalis v. ovali-oblongus, longitudine ferè pedunculi, pistillis numerosissimis undique tectus. Perianthium nullum. Ovaria mutuâ pressione subhexagona, parietibus tenuiter membranaceis basi cohærentibus.

Stigma brevi-conicum, sessile, summâ facie 2- vel rariùs 3-lobum, lobis subannularibus annulis intùs interruptis. Placentæ tot quot lobi stigmatis et cum iis alternantes, ovarii parietibus per totam ejus longitudinem adnatæ, hinc inde fasciculos raphidum aciculari-fusiformium continentes, instructæ filis duobus vasculosis subparallelis, gerentibus ovula numerosissima minuta, transversim in materie gelatinosâ cavitatem replente quasi suspensa. Spadix fructiferus 1—2-pollicaris, pollicem usque crassus, oblongo-ellipticus, pedunculo nudo pollicari insidens. Pericarpia baccata, coalita, singula unilocularia, polysperma. Semina minuta, ope processûs placentæ brevis fungosi prope basin affixa, oblongo-cylindrica, vix arcuata, basi apiceque parum attenuata, strophiolis duobus longitudinalibus, altero (interno) majori, albis, fungoso-cellulosis, fasciculis raphidum hinc inde farctis, semi-immersa. Testa tenuis, castanea, longitudinaliter striata, striis impresso-punctatis. Raphe a strophiolo majore obtecta, in chalazam apicalem conspicuam desinens. Membrana interna tenuissima, hyalina. Albumen carnosum, copiosum. Embryo parvus conicus, radiculâ incrassatâ in albuminis basi prope umbilicum positâ.

The genus *Freycinetia* was named by M. Gaudichaud, in the botanical part of M. Freycinet's "Voyage autour du Monde*," in honour of the commander of the expedition. It had, however, been long previously indicated and characterized by Mr. Brown†, who refers to it, in a remark on the order *Pandaneæ*, as having been first observed by Sir Joseph Banks, and subsequently most beautifully depicted in Norfolk Island by Ferdinand Bauer. The species collected in Sir Joseph Banks's voyage were two in number, the *Pandanus demissus* and *P. inclinans* of Solander's MSS., natives severally of Otaheite and New Zealand: the Norfolk Island plant has recently been described by M. Endlicher, from Ferdinand Bauer's materials, under the name of *Freycinetia Baueriana*‡. These, with the three species characterized by M. Gaudichaud, (of which one, *Freycinetia arborea*, was from the Sandwich Islands, and the other two, *F. scandens* and *F. radicans*, were from the Moluccas,) and with that now figured and described, give a total of seven species at present known as belonging to the group, which is thus ascertained to be spread from Java through the Moluccas, northward to the Sandwich Islands, and southward to Otaheite, Norfolk Island and New Zealand.

The transition from *Pandanus*, in which there exists but a single seed, to *Freycinetia*, in which the seeds are very numerous, seems, as far as these plants are at present known, to be relieved by no intermediate gradations: but the species of the two genera, although differing in so important a character, are capable of the same natural subdivision, and thus form, as it were, two parallel series. In all the species of both groups the pericarpia adhere together at the base; in *Pandanus* from the cohesion of the pulpy mass connecting the fibrous coating of their ligneous and frequently even osseous putamens; and in *Freycinetia* from an actual consolidation of the soft and almost gelatinous substance of which their integuments are composed. This cohesion at the base appears to be universal, connecting together all the fruits of each separate spadix. In one subdivision of each genus the entire spadix consists of fruits more or less intimately, but all equally, cohering; while in the other and larger division, the apical portions of the pericarpia are also firmly united together, not in one single mass embracing the entire spadix, but in numerous partial fasciculi or phalanges, varying in the number of their component parts, and these phalanges, finally separating down to the very base, assume the appearance of distinct multilocular fruits. In the latter section of the genus *Freycinetia* we trace a partial approach in texture between the two genera, the fasciculated apices of the pericarpia in these species having the same fibrous structure with the coats of the drupes of *Pandanus*, although supported by bases which retain the soft and pulpy consistence characteristic of the genus to which they belong.

---

* p. 431. † *Prodr. Floræ Nov. Holl.* p. 341. ‡ *Prodr. Floræ Insulæ Norfolkicæ*, p. 25.

Even the simplest form of the ovarium of *Freycinetia* is at first sight strongly contrasted with that of *Pandanus.* In the latter a single seed is attached by a cicatrix near its base to an internal unilateral placenta, which is adnate to the whole length of the cell. In *Freycinetia Gaudichaudii* two, or sometimes three placentæ, alternating with the lobes of the stigma, adhere to the parietes of the cell; and each placenta is formed of two nearly parallel vascular cords, to which the very numerous seeds are affixed by means of short processes of a light and spongy texture attached to the base of their strophiola. The more complex ovaria, belonging to the fasciculated section, are also furnished with a number of similar placentæ corresponding with that of the stigmatic lobes. They are generally arranged in opposite pairs, forming a double series, the parietes between each pair constituting a double dissepiment for the separation of the cells of the compound fruit. In some cases, however, it would seem as though these dissepiments were evanescent, and nothing remained in the ripe fruit but the placentæ and seeds floating in a pulpy or mucous mass; but this it is extremely difficult to determine in the dried state, in consequence of the great tenuity of the membranous coats. Each extremity of this biseriate fasciculus is generally terminated by a single stigmatic lobe; and among the compound fruits there occasionally occurs a solitary ovarium, having but one stigmatic lobe, and furnished only with a single placenta. This simple form of ovarium is found, however, only as a rare exception; while in *Pandanus* the separate ovaria are always simple, and the cells of the fasciculated species are sometimes arranged in a single series, but frequently also in two, or sometimes even in a more complicated form.

In *Freycinetia inclinans, F. Baueriana,* and *F. demissa,* the only species of the fasciculated section of the present genus which I have had an opportunity of examining, the strophiola of the seeds are single, and extend the whole length of the inner face of the seed, protecting the raphe in its passage to the chalaza; but in *F. Gaudichaudii,* in addition to this internal strophiolum, there is a second external one, of smaller size and extending along the opposite or outer face of the seeds. These excrescences are of a light spongy texture, and are evidently nothing more than an extraordinary development of loose inflated cells formed on the surface of the testa. In common with the placenta, and with the testa generally, they abound in all the species with fasciculi of minute raphides, which are especially copious in *F. Baueriana.* The testa of the seeds of various species of *Pandanus* is equally replete with these minute crystalline bodies, the fasciculi of which are sometimes so conspicuous as to be visible to the naked eye; and it may be observed that, although no distinct strophiola are present in that genus, the portion of the testa which covers the inner face of the seed, and consequently protects the raphe, is of a much thicker and firmer texture than the rest.

The next important character in which the two genera differ is in the surface of the seeds. These, in *Freycinetia,* are beautifully striated longitudinally, and the striation is accompanied by an appearance resembling that of impressed dots, which is due to the regular transverse cells of the testa assuming a slightly bullated form. On the surface of the seeds of *Pandanus* no such appearance is remarked, but the separated testa, when observed under the microscope by transmitted light, bears a close resemblance to that of *Freycinetia*; and an equal similarity prevails in the texture of the inner membrane of both, which is extremely delicate and hyaline, with long and narrow longitudinal cells.

The embryo of *Freycinetia,* like that of *Pandanus,* as might be inferred from the existence of a raphe, is certainly at the base and not at the apex of the albumen, where it has been described and figured by M. Gaudichaud* in his *F. radicans.* The figure indeed contradicts itself; in as much as the raphe and chalaza are distinctly exhibited, while the latter is made to correspond directly with the outer extremity of the embryo; a relation of parts the reverse of what Mr. Brown has shown to obtain in Phænogamous plants†. The error probably arose from the combining of several observations in one figure; for the ripe seeds can so rarely be found adherent to the placenta, the traces of their attachment are so slight, and the two extremities (although capable of being distinguished with a little practice) are to outward appearance so nearly similar, that without paying due attention to the internal structure, such a confusion of base and apex might readily occur. M. Endlicher, who describes the fruit of the Norfolk Island species from Ferdinand Bauer's drawings, but states that the in-

* *Voyage autour du Monde, Botanique,* p. 431. t. 43. f. 7, 8.

† Appendix to Captain King's Narrative, &c. p. 540.

ternal structure of the seed was not explored, gives nevertheless, in the generic character,—from what materials does not appear,—the correct position of the embryo, as having " radicula umbilico proxima*."

The only described species with which *F. Gaudichaudii* has any immediate connexion is *F. scandens*, Gaud. from the island of Timor; and the resemblance is so great that I at first hesitated as to the propriety of their separation. There are, however, differences which, without an accurate comparison of specimens, it is impossible to reconcile. The form of the female spadix in *F. scandens* is described and figured by M. Gaudichaud as ovate, but this character is altered by M. De Caisne† to ovate-oblong, which agrees better with that of the Javanese species. The stigma is, however, said by both writers to be 3-lobed, and the dissected ovarium figured by M. Gaudichaud‡ has certainly three placentæ; while, on the other hand, the entire fruit, given at fig. 2., has the stigma distinctly bilobed. In *F. Gaudichaudii* the 3-lobed stigma is an exception of rare occurrence. Abortive stamina are represented at the base of the ovaria in *F. scandens*, and are certainly found in some of the fasciculated species: I have not, however, been able to detect them in *F. Gaudichaudii*. And lastly, the bases of the leaves are figured by M. Gaudichaud broad and somewhat sagittate; a character which a partial separation at the line of their articulation might give to those of the Javanese species also, but certainly not to the same extent. For these reasons it has appeared more advisable to regard the present as a distinct species, than to unite it with a plant, from no very distant country it is true, and certainly very intimately related, but nevertheless distinguished, as far as we know, by characters that cannot safely be neglected.

The species of *Freycinetia*, as has been before observed, naturally arrange themselves under the two following sections:

* *Pericarpia omnia æqualiter coalita, omninò baccata,*

Comprehending *F. Gaudichaudii* and *F. scandens* only, in both of which the cohesion of the pericarps is complete, and the entire surface of the spadix has a uniformly tessellated appearance: and

** *Pericarpia omnia basi coalita, apicibus elongatis fibroso-lignosis in phalanges partiales variè connatis.*

In this latter section, which comprehends *F. inclinans, Baueriana, arborea, demissa* and *radicans*, the leaves are much more elongated than in the former. The two last-named species, although distinctly belonging to it, partake in some degree of the characters of the former section, the pericarpia of *F. radicans* being, according to M. Gaudichaud, biplacentiferous, which is also frequently the case in *F. demissa*, where, as I have before observed, they are occasionally still further reduced to a single placenta. In the latter, however, they are more generally furnished with 4, 6, 8, or 10 placentæ; and the woody and lengthened apices of the fruits of both sufficiently indicate their true affinity.

Freycinetia Gaudichaudii, according to Dr. Horsfield's notes, is the " *Soge mane* of the Javanese. It was found, in 1809, in the eastern part of Java, in the districts of Lorog and Malang. It is by no means abundant. Many shrubby stems rise (crowded) from one point to the height of 6 or 8 feet, dividing into numerous branches, which are slender, diffuse, straggling, pendulous, or radicant, attaching themselves to the trees and shrubs growing in their neighbourhood, and sometimes climbing to a considerable height." I. J. B.

Tab. IX. *Fig.* 1. A branch of *Freycinetia Gaudichaudii*, in fruit, of the natural size. *Fig.* 2. Terminal portion of a branch of the female plant, in flower. *Fig.* 3. A male spadix, with its membranous spatha and bracteating leaf. *Fig.* 4. A portion of the male spadix, magnified. *Fig.* 5. A single stamen, after the bursting of its anthera, and the complete reflexion of the valves of the latter, assuming the form of a simple capitulum, more highly magnified. *Fig.* 6. Its filament, with the anther removed. *Fig.* 7. Grains of pollen. *Fig.* 8. Female flowers, cohering by their ovaria. *Fig.* 9. Two of the same separated and more highly magnified. *Fig.* 10. An ovarium laid open, showing the arrangement of the ovula on two parietal placentæ. *Fig.* 11. A separate fruit laid open, showing the arrangement of the seeds. *Fig.* 12. A seed. *Fig.* 13. Its larger strophiolum separated.

* *Prodromus Floræ Insulæ Norfolkicæ*, l. c.

† *Herb. Timor.* in *Nouvelles Annales du Muséum*, iii. p. 367.

‡ l. c. t. 42. f. 3.

Tab. X



PODOCARPUS CUPRESSINA

PODOCARPUS CUPRESSINA, *R. Br.*

TAB. X.

PODOCARPUS, *L'Hérit. et Auct.*

CHAR. GEN. *Flores* dioici, v. rariùs monoici. *Amenta mascula* cylindrica; stipitibus antherarum lobos polliniferos duos marginales extrorsùm debiscentes gerentibus. *Flores feminei* subsolitarii (in spicâ abbreviatâ), v. rariùs laxè spicati; squamulâ fructiferâ testæ seminis inversi omninò adnatâ. *Fructus* drupaceus, subglobosus.—Arbores *v.* arbusculæ *plerumque proceræ, lignum durum et utilem præbentes.* Folia *vel* (in Sect. 1 et 2.) *sparsa, linearia, nervo medio donata; vel* (in Sect. 3.) *quinquefariàm imbricata aut distichè patentia, enervia; vel* (in Sect. 4.) *opposita, ovata, nervo medio destituta.* Testa *integra membranam internam seminis ad maturitatem usque tegens.*

SECT. 3.

PODOCARPUS *cupressina,* foliis vel lanceolatis spinuloso-mucronatis arctè quinquefariàm imbricatis: vel lineari-lanceolatis aversis falcatis elongatis distichè horizontaliter patentibus, fructibus ramulos breves cernuos terminantibus.

Podocarpus cupressina. *R. Br. in Mirb. Geogr. Conif. in Mém. du Mus.* xiii. p. 75.
Podocarpus imbricata. *Bl. Enum. Pl. Javæ,* p. 89.

Arbor procerissima. Ramuli teretiusculi, frequentissimè divisi et subdivisi, foliis undique tecti. Folia quinquefariàm inserta, sesquilineam vel duas lineas longa, imbricatim appressa, acerosa, subtriquetra, lanceolato-subulata, spinuloso-mucronulata, stomatibus undique instructa; in ramulis junioribus, sterilibus et annotinis plerumque distichè patentia, aversa, elongata, lineas 3—8 longa, linearia, sursùm falcata. In ramulis quibusdam folia distichè patentia basin et apicem occupant, dum spatium intermedium foliis quinquefariàm appressis vestitur; in aliis pars apicalis tantùm illa gerit, dum hæc partem ambiunt inferiorem; in aliis denique folia omnia ejusdem ramuli vel distichè patentia vel quinquefariàm appressa. Hæc sola in ramis ramulisque fertilibus cernuntur. Fructus

solitarius, ramulorum brevium nutantium terminalis, foliis circumdatus quibusdam paulò longioribus et patentioribus, formâ tamen et dispositione cum reliquis congruentibus. Pedicellus nullus nisi receptaculum carnosum, fructûs ferè longitudine, crassiusculum; squamulis nullis distinctis, nisi unâ omninò liberâ, lateraliter apicali, teretiusculâ, obtusâ, aperturæ seminis oppositâ, alterâ minore collaterali quandoque comitatâ. Squamula bracteolaris nulla. In semine adhùc parvulo, squamula fructifera (illæ specierum Pini generis analoga) testæ seminis omninò adnata, nisi ad apicem semen paulò superantem cucullato-inflexum. Testa seminis inversa, ovata, initio a squamulâ fructiferâ facilè separabilis, demùm cum illâ confluens et in unum corpus coalita, apice (ad basin scilicet fructûs) foramine conspicuo perforata. Membrana seminis interna testæ cavitatem implens, et cum illâ pro maximâ parte cohærens, supernè in brevi spatio libera; aperturæ marginibus in tubum longiusculum cylindricum, apice breviter 3—4-fidum, extra foramen testæ prominulum, productis. Nucleus cum basi membranæ internæ cohærens. Semen penitùs maturum haud visum, sed paulò ante maturitatem drupam siccam emulans, subglobosum, mucronulo inconspicuo ex apice squamulæ persistente instructum; superficie uniformi, lævi, vix ullâ squamulæ testæque distinctione manente: membranâ internâ faciliùs quàm in semine juniore solubili.

The most remarkable character of *Podocarpus*, in addition to its fructiferous scale supporting a single inverted ovulum, consists in the second or additional coat which the seed retains entire till its perfect maturity. This character was originally pointed out by Mr. Brown in his "General Remarks on the Botany of Terra Australis*," and has since received further illustration in his "Observations on the Structure of the Female Flower of Cycadeæ and Coniferæ†," in connexion with the novel and extraordinary view then for the first time presented of the nature of the envelopes of the embryo in those families. Comparing *Podocarpus* with *Dacrydium*, he showed that in the young state of the female flower they were nearly similar in structure; and that the difference in their mature state depended on the occurrence, at a more advanced stage, of a rupture in the outer envelope of the latter, which thenceforward forms only a partial covering to the seed, and thus allows of its gradually assuming a nearly erect position with reference to the supporting scale. The scale is necessarily elongated in *Podocarpus* to an extent corresponding with the enlargement of the inverted seed, with which it intimately coheres throughout its whole length; but the protrusion of the seed of *Dacrydium* through its outer coat, and its assumption of an almost erect position, obviate the necessity of any such enlargement in the scale of the latter, which instead of becoming thickened and fleshy, retains its original size and foliaceous texture to the last. In a second species of *Dacrydium*, *D. elatum*, Wall.‡, found by Dr. Jack, and afterwards by Dr. Wallich, in Penang, the protrusion of the seed through its outer coat appears, so far as can be judged by specimens in an advanced state, to take place through an enlargement of the foramen, without any rupture of the coat.

This similarity in the original structure of the two genera has been controverted by M. Achille Richard§, who admits the outer envelope as existing in *Dacrydium*, but denies its presence in *Podocarpus*. In the former, indeed, it is too evident to admit of doubt; in the latter the distinction between the two coats is sufficiently obvious in the young state, although somewhat masked by the complete adhesion of the outer to the supporting scale, and afterwards still more completely by the confluence of the fleshy substance of both scale and outer envelope to form the uniform surface of the drupaceous fruit. The analogy of the scale with that which supports the seeds in the genus *Pinus* appears originally to have escaped the observation of the elder Richard‖; and even

* In Flinders's Narrative, &c. ii. p. 573.

† In King's Narrative, &c. ii. p. 557.

‡ List, No. 6045.

§ *Mémoire sur les Conifères*, p. 117 et 125.

‖ See his first arrangement of *Coniferæ* in the *Annales du Muséum*, tom. 16. p. 297.

when he afterwards became aware of it*, he seems, like his son, to have overlooked the distinct origin of the two coats surrounding the embryo. It is difficult to collect the true opinion of the latter on the subject of this genus. He first speaks of the scale (or fleshy unilateral disk) as a prolongation of the fleshy substance by which the scales of the receptacle are united, but seems to prefer regarding it as one of those scales changed in form and confluent with the flower, which opinion he supports by its analogy with *Dacrydium*. This leads him to propose a third hypothesis, according to which the disk is to be regarded as a kind of involucrum or cupula analogous to that of *Dacrydium* (viz. to the outer coat of its ovulum), but differing in its unilateral position : it sometimes, however, he adds, extends over the entire surface and constitutes the fleshy envelope of the fruit. It is curious that having thus derived, however erroneously, the whole of the outer fleshy covering, in one species at least, from the scale or disk, he afterwards maintains that it no more forms a distinct envelope from the inner and indurated coat, than the fleshy portion and the nucleus of a drupa constitute two distinct pericarps.

It is singular that so unessential a character as the generally solitary position of the ovuliferous scale should have induced all the authors who have attempted an arrangement of *Coniferæ*, to separate *Podocarpus* and *Dacrydium* from the true Pines, and to associate them with the Yew. That their true position is in the Abietine section of the family was pointed out to me by Mr. Brown when placing in my hands the specimens now described. Not only do their inverted ovula bear the same relation to the supporting scale as in the genera of that group; but we even find in *Araucaria* an analogous structure as regards the confluence of the scale with the envelope of the solitary ovulum. Thus *Podocarpus* might be regarded, in the more essential characters of its female flower, as an *Araucaria* reduced to a single fertile scale, or at most to three such scales, were it not that in the latter there exists, as far as we are yet aware, but a single envelope of the seed, while in the former its coats are double.

In the structure of their male organs *Podocarpus* and *Dacrydium* exhibit a close agreement with the genus *Pinus*, their antheriferous scales being disposed on a cylindrical amentum, and being each furnished with two marginal polliniferous cells dehiscing outwards. In all the species that I have examined, with the single exception of *P. Chilina*, Rich., the support is prolonged, as in *Pinus*, beyond the cells in the form of a membranous scale; and the want of this prolongation, as described and figured by the elder Richard in that species (the only one in which he had examined the male organs,) cannot, therefore, be considered, as he was disposed to regard it, as making part of the generic character†. The form of pollen, although not always a safe criterion in systematic arrangement, frequently affords, as in the present instance, a valuable adjunct. It is now some years since Mr. Brown pointed it out to me as readily distinguishing the *Cupressinæ*, including *Taxus*, from the greater portion of the true *Coniferæ*. The sphæroidal form of the grains in the former section, together with the singular mode in which their outer coats are ruptured and thrown off in consequence of the great capacity for absorbing moisture possessed by the mucous matter surrounding the inner, at once distinguish these from the well-known but ill-understood pollen of the genus *Pinus*. With the latter, that of *Dacrydium*, and of all the species of *Podocarpus* of which I have been enabled to examine the male flowers, is perfectly identical in structure, having the same curved oval form, the same darkly granular extremities, and the same transparent intermediate band. As no other form of pollen is known of a structure approaching this, the coincidence may be regarded as affording strong evidence of near affinity. That of *Araucaria*, it may be observed, appears to differ from the Cupressine form in its larger size and in the absence of the tendency to rupture its outer coat by the absorption of water; but the specimen of the male flowers of this genus which I have examined in the Banksian herbarium (those namely of *Araucaria imbricata*) having been collected in Chili by Mr. Menzies more than forty years ago, it is in some degree doubtful whether the action might not take place in more recent pollen. In *Dammara* (or *Agathis* of Salisbury) the form is probably the same, as might indeed be expected from the analogous arrangement of the polliniferous cells; but I cannot speak with certainty on this point, the

* *Mémoire sur les Conifères*, p. 113.

† *Ibid.*, p. 12. t. 1. f. 1. A. B.

specimens in the collection being immature, and having been long preserved in spirit. That of *Salisburia* is also sphæroidal, and apparently without any tendency to the rupture of its outer coat.

In his dissertation on the structure of pollen Dr. Hugo Mohl* has indicated the variations observed by him in that of *Coniferæ*, which differ in some minor points from the account given above. He divides the pollen of the family into sections, according as its grains are sphæroidal or ellipsoid; and enumerates three varieties of the first section. The first of these comprehends the true Cupressine form, in which he believes three distinct membranes to exist, and which he has noticed in *Cunninghamia* (mature pollen of which I have not seen), and in various species of *Taxus*, *Juniperus* and *Cupressus*; to which may be added *Callitris* and *Thuja*. The second form, which he believes to differ from the preceding in the absence of one of its membranes, he has observed, like myself, in *Araucaria imbricata*, if the specimens examined by him did not rather belong to *A. Brasiliensis*. The third, in which he again describes three membranes, the intermediate one furnished with an umbilicus, he states to occur in *Pinus Larix*. Of the ellipsoid form he notices two very distinct varieties, one of which (ellipsoid with a longitudinal sulcus) belongs to the dry pollen of *Salisburia*, the grains of which when moistened are, however, nearly spherical: the other, being the true and well-known Abietine structure, he appears only to have observed in certain species of *Abies* and *Pinus*. From all these forms that of *Ephedra*, described as ellipsoid with six longitudinal sulci, is remarkably distinct.

Regarding the subject in a systematic point of view, it may be observed that the first form of pollen here described occurs in all the species of true *Cupressinæ* which I have had an opportunity of examining, including examples of all the described genera except *Taxodium*, the pollen of which I have not yet seen, and including also *Taxus*, but not *Salisburia*; or, in other words, it is found in all those genera which have their antheriferous scales generally furnished with more than two abbreviated lobes. To these Professor Mohl adds *Cunninghamia*. This form of pollen is remarkable for its small size and great transparency; and still more for the dehiscence and throwing off of its outer coat on the application of moisture, leaving its inner membrane in the shape of a small granular nucleus surrounded by a circular area of expanded and very transparent mucus, the outline of which constitutes the additional intermediate coat described by Professor Mohl. On the other hand, the Abietine form of pollen has been found in all the examined species of *Pinus* and its subdivisions (with the single exception of *P. Larix*), in *Podocarpus* and *Dacrydium*; that is to say, in all those true *Coniferæ*, the antheriferous scales of which uniformly bear only two abbreviated lobes. The exception to this rule furnished by the Larch is the more anomalous, in as much as in the nearly related species *Pinus Deodara*, Roxb., and the common Cedar, the structure of pollen is absolutely the same with that of *P. sylvestris* and *P. Abies*. In the pollen of the Larch, notwithstanding the statement of Professor Mohl, I have been quite unable to detect anything which could have led to the belief of its possessing a third or intermediate membrane; neither have I yet seen its outer coat ruptured and thrown off, as in the Cupressine form, in consequence of the application of moisture. On the contrary, the difference between the two forms appears to me so great as to render an agreement between them in this particular highly improbable. The diameter of the pollen of the Larch is three or four times greater than that of *Thuja* or of the Yew; and its inner membrane, instead of forming a small central nucleus surrounded by a broad transpraent border, entirely fills the cavity of the outer. Of the pollen of those Coniferous genera whose antheriferous scales are furnished with numerous elongated lobes our knowledge is very imperfect; but that of *Araucaria*, as observed by myself, and as figured by Professor Mohl, does not appear to differ greatly in form and structure from that of the Larch; it is, however, somewhat smaller. Of the pollen of *Salisburia* I have already spoken.

The genus *Podocarpus*, established by L'Héritier, in 1788, on a Cape plant (*Taxus elongata*, Sol. in Hort. Kew. ed. I. iii. p. 415.) then growing in Kew Garden, long continued limited to that single species, the *P. asplenifolia* referred to it by Labillardière in 1806, having soon afterwards been recognised as forming a distinct

* *Beiträge zur Anat. und Physiol. der Gewächse*, p. 80.

genus, which was named first *Robertia*, then *Brownetera* and afterwards *Phyllocladus* by the elder Richard. In 1810, M. Richard* also added the names of two American species, *P. Chilina* and *P. coriacea*, which he subsequently described and figured in the elaborate memoir on the family published after his death by his son. In 1817, M. Kunth† described a fourth species from the Andes of Peru, *P. taxifolia*, which had previously been characterized by Willdenow under the name of *Taxus montana*. To these Mr. Lambert‡ appended, in 1824, two other American species, *P. oleifolia* and *P. glomerata*, both from Chili, and forming part of Pavon's collection; and also described two Asiatic plants under the names of *P. neriifolia* and *P. macrophylla*. The latter, as coming from Japan, he believed to be identical with the *Taxus macrophylla* of Thunberg; while the former, which was founded on specimens from Nepaul and Penang, probably comprehended two distinct plants. The eight species just enumerated received from Mr. Brown§, in 1825, an accession of no fewer than twelve others, consisting of two from the Cape of Good Hope, *P. latifolia* and *P. falcata*, which had been referred by Thunberg to the genus *Taxus*; one Japanese, *P. Nageia*, of which the same author had formed a species of *Myrica*; one from New Holland, described by Sir James E. Smith under the name of *Taxus spinulosa*‖; another from New Zealand, originally regarded by its discoverers Sir Joseph Banks and Dr. Solander as a species of *Dacrydium*, and described by Mr. Lambert under their manuscript name of *Dacrydium taxifolium*, now *P. spicata*; and seven species then for the first time indicated. Two of these, *P. cupressina* and *P. polystachya*, were from the Malayan Islands; three, *P. ensifolia*, *P. elata*, and *P. alpina*, from New Holland and Van Diemen's Land; one, *P. thuyoides* (*Dacrydium thuyoides* of Banks and Solander's MSS.), was from New Zealand; and the remaining one, *P. Antillarum*, from the island of Montserrat. As it appears from M. Richard's subsequent publication that his *P. coriacea* is from the same locality with the last, it is by no means improbable that the two plants may belong to the same species. Of the four species of *Podocarpus* characterized in Dr. Blume's "Enumeratio Plantarum Javæ," three, *P. amara*, *P. bracteata* and *P. latifolia*, Bl., were probably new; the fourth, *P. imbricata*, being synonymous with *P. cupressina*. Three other species have since appeared in Dr. Wallich's List¶, *P. Horsfieldii*, from the island of Penang, also synonymous with *P. cupressina*, *P. latifolia*, Wall.**, from the mountains of Sylhet, and *P. Chinensis*, Wall., originally from China, but cultivated in the Calcutta Botanic Garden. The last is the *Taxus Chinensis* of Roxburgh's "Hortus Bengalensis," p. 73, and the *Juniperus Chinensis* of the same author's "Flora Indica," iii. p. 840, but not of Linnæus.

Among these four- or five-and-twenty species, existing in such distant geographical positions, but closely agreeing in all the more essential particulars of the organization of their male and female flowers, and of their fruit, considerable differences may be observed in minor points of structure as well as in habit. These differences appear to me of sufficient importance to constitute four distinct sections of the genus, the characters of which, together with the list of species referrible to each (as far as they are known to me either by my own examination or by sufficient figures and descriptions) I shall here subjoin. It will be seen that in no case do the sections, which appear to me strictly natural, correspond with the geographical distribution of the species; and the discrepancy in this respect is particularly remarkable in the first section, which includes the plant on which the genus was established, and which will be found to comprehend examples from all the great geographical divisions of the globe, Europe alone excepted. Their range in latitude is also equally wide, extending from Japan in the northern hemisphere to Dusky Bay in New Zealand in the southern, and scarcely leaving any of the intermediate degrees, or even the line of the equator itself, unoccupied by one or other of the representatives of the group.

1. *Flores* dioici. *Amenta mascula* axillaria, solitaria v. aggregata. *Flores feminei* axillares, pe-

* In *Annales du Muséum*, xvi. p. 297.

† *Nov. Gen. et Sp. Plant.* 2. p. 2. t. 97.

‡ *Descr. Gen. Pinus*, 2. p. 20—22.

§ In *Mémoires du Muséum*, xiii. p. 75, 76.

‖ In Rees's Cyclopædia, vol. xxxv.

¶ Nos. 6049, 6050, 6051.

** Since figured and described in Dr. Wallich's *Plantæ Asiaticæ Rariores*, i. p. 26. t. 30.

dunculis (ramulisve brevibus) nudis suffulti; receptaculo aucto carnoso ex axi spicæ abbreviatæ et sæpiùs 1-floræ, cum squamulis duâbus v. tribus, apicibus tantùm liberis, bracteolarum subtendentium vicem gerentibus, coalitâ.—Folia *quinquefariàm inserta, undique versa, linearia v. oblonga, nervo medio instructa, stomata in paginâ inferiore tantùm gerentia.*

Capenses.

P. elongata, L'Hérit. (*exam. sicc.* ♂ *et* ♀.)
P. falcata, R. Br. (*v. sicc. sine fl.*)
P. latifolia, R. Br. (*exam. sicc.* ♀.)

Asiaticæ.

P. Chinensis, Wall. (*exam. sicc.* ♂ *et* ♀.)
P. polystachya, R. Br.—*P. macrophylla*, Wall. List, No. 6052 B. (*exam. sicc.* ♂ *et* ♀.)
P. macrophylla, Lamb. (*exam. sicc.* ♂ *et* ♀.)
P. neriifolia, Don.—*P. macrophylla*, Wall. List, No. 6052 A. (*exam. sicc.* ♂ *et* ♀.)
P. amara, Bl. (*ex ejus char.*)
P. bracteata, Bl. (*exam. sicc.* ♀.)

Novæ Hollandiæ et Insulæ Van Diemen.

P. elata, R. Br. (*exam. sicc.* ♀.)
P. spinulosa, R. Br.—*P. pungens*, Lamb. (*exam.* ♀ *sicc. et in sp. vin. conservat.*)
P. alpina, R. Br. (*exam. sicc.* ♂.)

Americanæ.

P. Chilina, Rich.—*P. saligna*, Lamb. (*exam. sicc.* ♂ *et* ♀.)
P. coriacea, Rich.—*P. Antillarum*, R. Br.? (*ex descr. et fig. Rich.*)
P. oleifolia, Lamb. }
P. glomerata, Lamb. } (*ex ejus descrr.*)

2. TAXOIDEÆ. *Flores* dioici. *Amenta mascula* in ramulis lateralibus spicata. *Flores feminei* in ramulis lateralibus quoque spicati, receptaculo carnoso nullo insidentes, squamulâ subtendente bracteolati.—Folia *quinquefariàm inserta, disticha, linearia, nervo medio instructa, stomata in paginâ inferiore tantùm gerentia.*

P. spicata, R. Br.—*Dacrydium taxifolium*, Banks & Sol., Lamb. (*exam. sicc.* ♂ *et* ♀.)

This species, first found by Sir Joseph Banks and Dr. Solander in New Zealand, is the only one that can with certainty be referred to the present section; but the *P. taxifolia* of M. Kunth, which I have not seen, ought probably to be associated with it, as it well agrees both in habit and in the structure of its female flowers. The spike, however, seems in the latter species (according to the figures and descriptions of M. Kunth and M. Richard) to be reduced to its terminal flower, the lateral branch which supports it having become leafy, and the two or three vacant squamulæ below it tending to coalesce into a fleshy receptacle, similar to that which occurs in the preceding section. On the specimen figured by M. Richard*, the penultimate squamula subtended an abortive flower, thus

* *Mémoire sur les Conifères*, p. 15. t. 29. f. 1. B. C.

showing a distinct tendency towards the spiked arrangement of the flowers in the New Zealand species. I may add that two flowers are also frequently met with in species belonging to the previous section, as I have myself observed in *P. latifolia*, as Mr. Brown has pointed out to me in *P. spinulosa* and *P. Chinensis*, and as Rumphius* has described and figured them in his *Lignum Emanum*, which is in all probability the same with *P. bracteata*. This tendency to add to the number of flowers, on which I had at first laid but little stress, I have since seen reason, on Mr. Brown's suggestion, to regard as of great importance, and even to introduce it into the generic character: it is obviously connected with the structure of the so-called receptacle, which is made up of several bracteæ becoming fleshy and cohering with the axis of the reduced and abbreviated spike, and consequently readily admits of the development of one or more additional flowers.

3. DACRYDIOIDEÆ. *Flores* dioici. *Amenta mascula* terminalia, solitaria. *Flores feminei* ramulorum terminales solitarii; receptaculo aucto carnoso sessili, squamularum indicia nulla præbente, ad apicem foliolum unicum, rarò duo collateralia, teretiuscula, aperturæ seminis opposita, gerente.—Folia *quinquefariàm inserta, subtriquetra, acerosa, appressa; in arboribus junioribus, ramulisque sterilibus et annotinis, plerumque disticha, aversa, falcata; omnia undique stomatibus instructa.*

P. thujoides, R. Br.—*Dacrydium thujoides*, Banks & Sol. MSS.—*P. dacrydioides*, A. Rich.† (*exam. sicc.* ♀.)

P. cupressina, R. Br.—*P. Horsfieldii*, Wall. List.—*P. imbricata*, Bl. (*exam. sicc.* ♀.)

My knowledge of the disposition of the male amenta in this section is derived from Solander's MSS. and refers only to the first-named species, which is a native of New Zealand: as in the other sections of the genus it appears to be modified in a corresponding manner to that of the female flowers. The difference in the form and arrangement of the leaves on the older and fertile branches and on the young shoots, so common in most of the genera of this family, is more than usually marked in the present section, and gives a singular appearance to the trees of which it is composed: it is, however, less conspicuous in the New Zealand species than in *P. cupressina*, which is a native of Penang as well as Java. Specimens of a second species from New Zealand, without flower or fruit, but evidently referrible to this section, were collected by Sir Joseph Banks and Dr. Solander, and received from them the manuscript name of *Lycopodium arboreum*, strongly evidencing the great resemblance borne by its distichous, averse and falcate leaves to those of numerous species of that heteromorphous genus.

4. DAMMAROIDEÆ. *Flores* monoici. *Amenta mascula* fasciculata; fasciculi pedunculis (ramulisve brevibus) oppositis, axillaribus, nudis, suffulti. *Flores feminei* oppositi, similiter pedunculati; receptaculo aucto carnoso ex axi spicæ abbreviatæ 1-floræ cum squamulis pluribus apicibus tantum liberis coalitâ; squamulâ terminali bracteolæ subtendentis vicem gerente.—Folia *opposita, ovata, nervo medio destituta, stomata in utrâque paginâ gerentia.*

P. latifolia, Wall. *nec* R. Br. *nec* Bl. (*exam. sicc. fl.* ♂ *et* ♀ *gerentem.*)

This species, forming part of Dr. Wallich's collection from the mountains of Sylhet, is the only certain representative of the present section with which I am acquainted. *P. Nageia*, of which I have only seen specimens in Kæmpfer's herbarium without either flower or fruit, would belong to this section from its habit and from its monoicous flowers, were it not that the leaves have stomata only on the under surface. There is nothing in the form either of the male amenta or of the fruit, as figured by Kæmpfer‡, repugnant to this position, except in the unimportant character of the fasciculus of the former being sessile instead of pedicelled. *Podocarpus? zamiæfolius*, A. Rich.§, with oblong leaves, bearing stomata only on their under surface, and uniformly opposite in the

* *Herbarium Amboinense*, iii. p. 47. t. 26.

† In *Voy. de l'Astrol., Bot.*, p. 358. t. 39.

‡ *Amænitates Exoticæ*, p. 773. t. 875.

§ *Voy. de l'Astrolabe, Bot.* p. 360.

specimen (without flower or fruit) in the Banksian herbarium, which was collected in New Zealand by Mr. George Bennett, bears some resemblance in habit to the foregoing species, but is probably identical with *Dammara australis*, Lamb. Like the latter it is known, according to Mr. George Bennett, by the native name of *Cowrie*, or according to the French voyagers by that of *Koudi*. The Amboyna *Dammar* is equally destitute of stomata on the upper surface of its leaves.

Podocarpus cupressina, the "*Chomoro* or *Chamara* of the Javanese, was found first," Dr. Horsfield states, "in 1806 on the Tengger-hills at the eastern extremity of the island, and noticed subsequently on almost every range or mountain exceeding the height of 5000 feet above the level of the ocean: it commences where the cocoa-nut trees cease to grow and the culture of rice can no longer be carried on. It is abundant on many of the mountain-peaks. The wood is of a light yellow colour, has a hard grain and takes an excellent polish: it is durable, not very heavy, and much used by the natives inhabiting high situations, in the construction of their houses and for various domestic purposes. It is occasionally brought to the plains and sold to Europeans, who employ it in the construction of furniture, &c. Of its habit," Dr. Horsfield adds, "I extract the following from a journal: Arbor maxima; trunco tereti, erecto, strictissimo. Rami erecto-patentes, inde flexuosi. Ramuli diffusi, nudi; ramusculi sparsi aut subverticillati, absque ordine oppositi aut conferti, nudi." I. J. B.

Tab. X. *Fig.* 1. A fertile branch of *Podocarpus cupressina*, of the natural size. *Fig.* 2. A sterile branch of the same, with the two kinds of leaves. *Fig.* 3. Another branch with the distichous leaves more developed. *Fig.* 4. A young fruit, seen laterally, shewing the fleshy receptacle and the squamula surmounting it. *Fig.* 5. The same viewed from the side corresponding with the aperture of the testa, which is seen at its base: the squamula is removed, and the apex of the fructiferous scale is seen forming a cucullate projection at the apex of the fruit. *Fig.* 6. A longitudinal section of the same, showing the testa, inner membrane, and nucleus. *Fig.* 7. A more advanced fruit, in which the fructiferous scale is distinguishable only by a narrow longitudinal band on the surface of the fruit, with a slight projection at its apex. The last four figures magnified.



BRAGANTIA TOMENTOSA.

BRAGANTIA TOMENTOSA, *Bl.*

TAB. XI.

BRAGANTIA, *Lour. Fl. Cochinchin.* p. 528; *Bl. Enum.* p. 82.—Ceramium, *Bl. Bijdr.* p. 1134.—Trimeriza, *Lindl. in Bot. Reg.* t. 1543, *in text.*—Apama, *Lam. Enc. Méth.* 1. p. 91.

CHAR. GEN. *Perianthium* æquale, trifidum. *Stamina* 6 vel 9 (rariùs 5 vel 8), filamentis columnæ adnatis; antheris linearibus. *Stigmata* 3, 6, vel 9 (rariùs 4 vel 5), lineari-subulata, erecta. *Pericarpium* siliquæforme, 4-loculare, 4-valve, polyspermum. *Semina* ovato-triquetra, transversim rugosa.

Suffrutices *geniculatim flexuosi, decumbentes v. suberecti.* Folia *reticulatim venosa.* Spicæ *laterales, v. axillares, pauciflorœ.* Flores *quandoque* (*in* Br. Wallichii) *diclines.*

BRAGANTIA *tomentosa,* foliis ovatis v. oblongo-ovatis, spicis in inferiori caulis parte lateralibus, fauce perianthii annulo elevato cinctâ.

Bragantiæ sp. nov., *R. Br. in Linn. Trans.* xiii. p. 219.
Ceramium tomentosum, *Bl. Bijdr.* p. 1134.
Bragantia tomentosa, *Bl. Enum. Pl. Javæ,* p. 82.

DESCR. Suffrutex pedalis, sapore intensè amaro. Radix fibrosa, fibris crassiusculis. Caules plures fasciculati, basi decumbentes, geniculatim flexi, angulato-sulcati, pilis adpressis hispidiusculi. Folia in summo caule duo vel tria, raro solitaria, alterna, ovata vel oblongo-ovata, vix acuminata, obtusiuscula cum mucronulo, basi parùm inæqualia, rariùs subcordata, 3—6 pollices longa, 2—3 lata, suprà glabra, subtùs breviter tomentosa, inter venarum ramificationes pulchrè reticulata; petiolis pubescentibus, foliorum lateralium 3 v. 4 lineas longis, terminalium 6 v. 8. Flores spicati; spicis in singulo caule 2—4, ad caulis genicula inferiora ex axillâ folii bracteolaris parvi, ovati, hispidi, deflexi, ortum ducentibus, sesquipollicaribus, bracteas plurimas imbricatas, oblongo-ovatas (quarum inferiores plerùmque vacuæ, superiores florigeræ) gerentibus. Perianthium superum, deciduum, monophyllum, extùs hispidum, intùs nudum, atropurpureum, subcoriaceum, venosum; tubo campanulato; limbo 3-fido, lobis rotundato triangularibus, æstivatione valvatis; fauce processu angusto

annulari intùs auctâ. Stamina 6 (v. rariùs 5); filamentis brevissimis, cum stylo arctè connatis. Antheræ oblongæ, biloculares, extrorsæ, connectivo internè adnato prominulo mucronulatæ, perianthii tubum vix superantes. Pollen parvum, læve, subglobosum. Ovarium inferum, filiforme, obsoletè tetragonum, hispidum, 4-loculare, loculis polyspermis, ovulis angulo interno loculorum affixis. Columna brevis. Stylus filamentis connatis parùm longior, apice in stigmata 3 (rarò 4), erecta, subulata, obtusa, antheras paulò superantia, divisus. Fructus $1\frac{1}{2}$—2-pollicaris, lineas 2 v. 3 crassus, siliquæformis, tetragonus, 4-locularis; seminibus numerosis, triquetris, utrinque sed præcipuè ad basin acutis, transversim sulcato-rugosis, serie simplici affixis. Testa crassiuscula fragilis; raphe per alterum seminis angulum ad chalazam parvam subrotundam ducta; membrana interna tenuis; albumen semini conforme, copiosum, oleagineum; embryo in seminis basi, minutus, cordato-emarginatus; radicula hilo proxima.

The genus *Bragantia* was established by Loureiro* on a Cochinchinese plant, an authentic specimen of which from Loureiro himself, is contained in the Banksian herbarium. It was referred by Mr. Brown, in his memoir on *Rafflesia*, to the order *Asarinæ*†; and in the same place mention was made of a new species discovered in Java by Dr. Horsfield. This is the plant now figured and described. A few years afterwards Dr. Blume, while resident in the East, characterized the Javanese species as a new genus under the name of *Ceramium tomentosum* ‡, referring it to the natural order of *Onagreæ*; but after his return to Europe he became aware of its true affinities, and of its generic accordance with Loureiro's plant, and he therefore changed its name to *Bragantia tomentosa* §. Subsequently to this, a third species, *Brag. Wallichii*, has been distinguished by Mr. Brown ‖, founded on specimens derived from the collections of Dr. Heyne and Dr. Wight, and contained in the Indian herbarium presented to the Linnean Society, on Dr. Wallich's recommendation, by the Directors of the East India Company. Dr. Wight's plant was found in the mountains near Courtallum ¶; and the same species had long previously been figured by Rheede** under the Malabar name of *Alpam*. If, as Mr. Arnott states††, it is precisely the same as *Trimeriza piperina*, Lindl.‡‡, it is also found in Ceylon. Professor Lindley has since characterized a species of *Bragantia* from the Burman Empire, under the name of *Brag. latifolia*; but as I have not seen specimens of the plant, and the characters given afford no means of distinguishing it, I know not whether it be distinct from the Javanese.

The Cochinchinese and Indian species closely resemble each other in habit; but that of the Javanese is somewhat different. Instead of the lanceolate and acuminate leaves and the axillary inflorescence of the two former, it has ovate or oblong-ovate leaves, with the lower part of its stem naked, and bearing the spikes near its base in the axillæ of small and inconspicuous bracteæ, which occupy the places of the leaves at its inferior geniculations; and it has besides an annular enlargement of the faux of the perianthium which is wanting in the others. Dr. Blume describes the fruit as indehiscent, and no dehiscence has taken place, or is clearly indicated, in the specimens which I have examined: the latter, however, can scarcely be regarded as perfectly mature. Loureiro's character of the genus contains the phrase "siliqua—4-valvis," and such is undoubtedly its character in the ripe fruit of *Brag. Wallichii*, contained in the herbarium of the Linnean Society. It is probable, therefore, that ripe specimens of the fruit of the Javanese plant would prove the latter to be equally dehiscent with the other species.

In the number of their sexual organs the species not only differ from each other, but are liable to trifling variations in different flowers of the same species. Thus, the regular number of stamina and stigmata in *Brag.*

* *Flora Cochinchinensis*, p. 508.

† Linnean Transactions, vol. 13. p. 218.

‡ *Bijdr. Fl. Nederl. Ind.* p. 1134.

§ *Enumeratio Plantarum Javæ*, p. 81—2.

‖ Wallich, List, No. 7415.

¶ Wight and Arnott in Edinb. New Phil. Journ. xv. p. 181.

** *Hort. Malab.* vi. p. 51. t. 28.

†† Edinb. New Phil. Journ. xvii. p. 260.

‡‡ Botan. Regist. t. 1543 *in text*

tomentosa appears to be 6 and 3 respectively; but the stamina are sometimes reduced to 5, and the stigmata increased to 4. In like manner, of two flowers of *Brag. racemosa* which I have examined, one had 9 stamina and 6 stigmata, and the other 8 of the former and 5 of the latter; while Loureiro describes the flowers as hexandrous. Of *Brag. Wallichii* I have imperfectly examined a single male flower, in which I was not able to detect more than 8 stamina; but the species is described by Dr. Wight and Mr. Arnott, and also by Professor Lindley, as having 9 stamina in three phalanges. To this appearance of combination of the stamina by threes it is doubtless owing that Dr. Wight's specimens in the Indian herbarium of the Linnean Society are labelled as belonging to the class "Polyadelphia;" and the same appearance was observable in the enneandrous flower of *Brag. racemosa* to which I have just referred; but on closer examination the approximation of the stamina is found to be more apparent than real. On the other hand Dr. Heyne's specimens of *Brag. Wallichii* are labelled "Monœcia Decandria," from which we may infer that the number of stamina in that species is sometimes increased to ten, and may be led to doubt whether the sexes are really, as described by Mr. Arnott, on distinct plants.

To distinguish his genus *Trimeriza*, Professor Lindley would seem to rely on this supposed arrangement of the stamina in three phalanges, and on the absence of the annular corona of the faux of the perianthium; but both these characters are equally applicable to the original species of *Bragantia*. The former is, as I have before observed, merely a tendency to approximate, unaccompanied by any actual combination, and not to be detected when the stamina are turned back and their points of attachment to the column rendered visible. The presence of the *corona faucis* in the Javanese plant (and I presume also in the Burmese, from which Professor Lindley appears to have taken his generic character of *Bragantia*) is somewhat more important, but will scarcely be regarded as of sufficient value by itself to constitute a generic difference in so limited a group. On the unisexual flowers no stress can be laid, inasmuch as the Cochin Chinese plant, which agrees in every other particular with the Indian, is hermaphrodite.

In affinity *Bragantia* appears to hold a middle station between the three genera *Asarum*, *Aristolochia* and *Thottea*, to each of which it approaches in different particulars of its structure. In habit, in the divisions of its perianthium, in the form of its capsules, and in that of its seeds, it agrees most nearly with *Thottea**; it differs, however, most essentially in the number and disposition of the stamina, which in *Thottea* are stated to be arranged in a double series, each series containing more than twice the whole number found in *Bragantia*. In perianthium *Bragantia* also approaches *Asarum*, and its habit (at least in the Javanese species) is not very widely different; but the form and structure of the indehiscent capsule of the latter, and its differently shaped strophiolated seeds, together with the number of its stamina, the difference of their place of insertion, and the form of its antheræ, leave a wide hiatus between them. With *Aristolochia* its chief agreement is in the number and insertion of its stamina; but there is a material difference between the two genera in perianthium, fruit, and seeds. The stigmata vary in number, form, and arrangement, in the different genera; discoidally radiate, with more or less adherence *inter se* in *Thottea* and *Asarum*; separate, thickened, and stellate in *Aristolochia*; and distinct,

---

* To the description of the latter, as given by Rottböll, from Kœnig's MSS., (in the *Nya Samling Danske Videnskabers Selskabs Skrifter*, 2. p. 529 &c.) may be added, from the MSS. of the latter in the Banksian collection, the following description of the seeds, which are not noticed in the published account: "semina numerosa, oblongo-ovata, obsoletè triquetra, semine Fœnugræci majora, superficie rugosa, callosa, cinereo-albicantia." It is obvious therefore that they bear a near resemblance to those of *Bragantia*. As this remarkable plant, specimens of which from Kœnig are contained in the Banksian herbarium, appears not to have been met with since 1779, when it was collected by him in Malacca, it may be worth while to subjoin, from his MSS., the exact habitat in which it was found, viz. "in sylvis prope Pringi:" the author adds "et aliis locis non observavi." Although sufficiently well described and figured in the Danish Society's Transactions, it has been entirely neglected by the compilers of "Species," who seem by common consent to have consigned it to oblivion; and has only been noticed by Mr. Brown, who, in the memoir above referred to, pointed out its proper place in the natural system, which Rottböll had widely mistaken.

linear, and erect in *Bragantia*; they afford additional means of discrimination, were such means necessary, between the genera of this small but interesting group.

The present species, "*Singo-dapur* of the Javanese, was found," Dr. Horsfield states, "in 1805, on the acclivities of the mountain Ungarang, situated near the middle of Java, about fifteen miles southward of the capital of Semarang. It grows in the forest, in a rich soil, about 1500 or 2000 feet above the sea. The stem is suffruticose and procumbent. It belongs to the Materia Medica of the Javanese, being used as an emmenagogue."

I. J. B.

Tab. XI. *Fig.* 1. *Bragantia tomentosa*, of the natural size. *Fig.* 2. A flower, magnified. *Fig.* 3. The column, showing the attachment of the stamina, and form of the stigmata. *Fig.* 4. A stamen separate. *Fig.* 5. A transverse section of the ovarium. *Fig.* 6. A seed. *Fig.* 7. A longitudinal section of the same, showing the position of the embryo, which is also shown separate.



CONOCEPHALUS SUAVEOLENS, *Bl.*

TAB. XII.

CONOCEPHALUS, *Bl. Bijdr.* p. 484.

CHAR. GEN. *Flores* dioici, in capitulis paniculatis densè congesti. *Perianthium* tubulosum, 4-fidum, demùm 4-partitum. *Masc. Stamina* 4. *Rudimentum pistilli abortivi* obconicum. *Fem. Stylus* nullus. *Stigma* subulatum, unilateraliter pilosum. *Nux* perianthio persistente tecta, pulpâ gelatinosâ obvoluta, elliptica, compressiuscula. *Semen* erectum. *Albumen* tenuissimum. *Cotyledones* subfoliaceæ, plano-convexæ.

Frutices *ramis crassis longè scandentes.* Folia *alterna, longè petiolata, integerrima, vel subrepanda.* Capitula *globosa, axillaria, corymboso-paniculata.* Flores *parvi, numerosissimi, albidi, quandoque fragrantissimi.*

CONOCEPHALUS *suaveolens*, foliis ovato-subrotundis v. ovatis obsoletè cordatis glabris.

Conocephalus suaveolens, *Bl. Bijdr.* p. 484.
Conocephalus naucleiflorus, *Lindl. in Bot. Reg.* t. 1203.
Urtica naucliflora, *Roxb. Fl. Ind.* 3. p. 592.

DESCR. Frutex longissimè scandens, ramulis crassis, ferrugineis, teretibus, parùm rugosis. Folia alterna, 4—8 pollices longa, ovato-subrotunda, vel ovata, obsoletè cordata, integerrima vel subrepanda, penninervia; suprà punctis minutis, albidis, creberrimis, tactu minimè asperis, adspersa; infrà nervo medio primariisque prominentibus, in intervallis obsoletè reticulatim venulosa; decidua cicatrices conspicuas relinquentia. Petioli crassi, rugosi, suprà pubescentes, $1\frac{1}{2}$—2-pollicares. Stipulæ binæ, intra petioli basin concretæ in unicam, lanceolatam, pollicarem, extùs pubescentem, gemmam involventem, demùm caducam et cicatricem semiannularem relinquentem. Flores diclines (dioici ex Roxb., Blume, et Horsfield) capitati, capitulis corymboso-paniculatis. Paniculæ axillares, vel casu foliorum laterales, bipollicares, pedunculo communi partialibusque angulatis, pubescentibus, in medio et sub ramificationes gerentibus bracteas ternas vel quaternas subverticillatas, ovatas, acutas, concavas, post casum cicatricibus conspicuis notandas. MASC. Capitula plurima, brevi-pedicellata, subsphærica, magnitudine pisi, rufo-ferruginea; involucro nullo; receptaculo

ex apice pedicelli parùm incrassato efformato, floribus parvis, sessilibus, numerosissimis, densè compactis (teste Roxburghio fragrantissimis) undique tecto. Perianthia 4-fida, laciniis lineari-ovatis, acutis, ferè ad apicem valvatim cohærentibus, facilè tamen demùm secedentibus, apicibus inflexis, marginibus obsoletè setosis. Stamina 4, perianthii laciniis opposita; filamentis planis, laciniarum longitudine; antheris subovatis, bilocularibus, dorso affixis, initio inflexis, demùm erectis, polline minutissimo, lævi, subsphærico, repletis. Pistilli rudimentum abortivum pellucidum, obconicum vel clavatum, longitudine filamentorum. Fem. Capitula longiùs pedicellata, multo majora, pollicem ferè lata, subsphærica; involucro nullo; receptaculo ex apice pedicelli dilatato, floribus numerosissimis, densè compactis, pedicellatis, (ex Roxburghio suaveolentibus,) supernè tecto. Pedicelli 2—3 lineas longi, demùm incrassati, mutuâ pressione angulati. Perianthia 4-fida, laciniis lineari-oblongis obtusiusculis, initio ferè ad apicem valvatim cohærentibus, citò tamen facillimèque ad basin ferè solubilibus. Staminum rudimenta nulla. Ovarium ellipticum, ovulo solitario erecto, membranis circa aperturam apicalem in funiculi superioris speciem elongatis. Stylus nullus. Stigma simplex, subulatum, apice plerumque uncinulatum, altero latere pilosum. Nux elliptico-lanceolata, compressiuscula, perianthio persistente tecta, materie pulposâ extùs obvoluta, chartacea, fragilis, in superficie cellulosa. Semen erectum, nuci conforme. Testa crassiuscula. Albumen, lamella tenuissima, quandoque vix conspicua, (ex Roxburghio in recenti succulenta). Embryo inversus; radiculâ nempè superâ, majusculâ, ovato-conicâ; cotyledonibus oblongis, subfoliaceis, plano-convexis, intùs obsoletè longitudinaliter substriatis.

In indicating the family of *Artocarpeæ*, in the Appendix to Capt. Tuckey's Narrative*, Mr. Brown has referred to it an African genus, under the name of *Musanga*, derived from the native appellation of the tree, placing it between *Coussapoa* of Aublet and *Cecropia*, with the latter of which he states it to agree in habit, differing from it chiefly in the structure and disposition of its monandrous male flowers, and in the form of its female amenta. Nearly related to these genera, and closely agreeing with them in the essential characters of their fruit and seed, is that which forms the subject of the present article, and which may be said to agree in habit with *Coussapoa* as much as *Musanga* does with *Cecropia*, and to differ from that genus, as far as the female flowers are concerned, (for the male of *Coussapoa* is still unknown,) in little else than its pedicellate and deeply divided perianthium, lengthening and enlarging as the fruit advances towards maturity, and destitute at all times of the ventricosely urceolate form which characterizes that of *Coussapoa*. As all these genera, with the exception of *Cecropia*, are but little known, and one of them, *Musanga*, has never yet been described, I may perhaps be permitted to take a general review of the characters which are common to them, and then to endeavour to trace, with as much precision as the materials within my reach will allow, the generic peculiarities of each.

The four genera in question, *Cecropia*, *Musanga*, *Coussapoa*, and *Conocephalus*, agree in having diœcious flowers, densely aggregated in simple or panicled capitula; a tubular perianthium; filaments inflected in æstivation, with resupinated anthers; a single erect ovulum; a simple stigma; the fruit inclosed in the persistent perianthium, of a subligneous texture and surrounded by a gelatinous pulp; and a straight inverted embryo without albumen, or furnished only with a very thin lamella of albuminous matter. They are all tropical trees or shrubs producing a milky juice, with alternate petiolated leaves; intrafoliaceous stipulæ, usually of large size, united at their inner margin, and protecting the axillary bud and the apex of the branch until thrown off by its continued growth; and small and crowded flowers, closely pressed together. Their distinctive characters may be given as follows:

* p. 454.

Cecropia, *Læfl.*

Flores diœci, in spicis fasciculatis densè congesti, sessiles. *Perianthium* tubulosum. *Masc. Perianthium* sub-bidentatum, rimâ transversali hians. *Stamina* 2. *Rudimentum pistilli* 0. *Fem. Perianthium* ore contractum, subintegrum. *Stylus* brevissimus. *Stigma* obliquè peltatum.—Arbores (*Americæ Æquinoxialis,*) foliis *in ramulorum apicibus confertis, palmato-lobatis, quandoque peltatis, lobis integerrimis.* Stipulæ *magnæ, spathiformes.* Spicæ *pedunculo communi suffultæ, femineæ quam masculæ pauciores.*

Spec. exam. *Cecropia peltata,* L.

Musanga, *R. Br.*

Flores diœci, sessiles, densè congesti, squamis bracteiformibus interstincti. *Perianthium* tubulosum, subintegrum. *Masc. Capitula* paniculata. *Perianthium* patens. *Stamen* 1. *Rudimentum pistilli* 0. *Fem. Capitulum* spicatum. *Perianthium* ore coarctatum. *Stylus* filiformis. *Stigma* penicillatum. *Nux* perianthio persistente tecta, ovato-elliptica, compressiuscula, sublignosa.—Arbor (*Africæ Occidentalis*), foliis *digitatis, foliolis integerrimis.* Stipulæ *maximæ, coriaceæ, calyptriformes, integræ.* Capitula *mascula subglobosa; feminea oblonga, crassa.*

Spec. exam. *Musanga Smithii,* R. Br. (in herb. Banks., in Congo a b. Chr. Smith lect.)

Coussapoa, *Aubl.*

Flores diœci . . . . *Fem. Capitula* paniculata. *Perianthium* sessile, ventricoso-urceolatum, ore coarctato brevissimè 4-dentatum. *Stylus* vix ullus. *Stigma* obliquè peltatum, penicillatum. *Nux* pulpâ gelatinosâ intra perianthium persistens tenuissimum obvoluta, elliptica, sublignosa. *Albumen* tenuissimum. *Cotyledones* subfoliaceæ plano-convexæ.—Arbores (*Americæ Æquinoxialis*), *foliis integerrimis.* Stipulæ *spathiformes, convolutæ.* Capitula *feminea subglobosa.*

Spec. exam. *Coussapoa latifolia,* Aubl., et *C. angustifolia,* Aubl. (ambæ in herb. Banks., ab Aublet in Guianâ lectæ.)

Conocephalus, *Bl.*

(*v. suprà.*)

With *Conocephalus* Dr. Blume* has associated another Javanese shrub, of a similarly scandent habit, to which he has given the generic name of *Gynocephalum,* and which he regards as extremely near in its affinity (*nimis affine*). But the "stylus semibifidus," and "embryo—cotyledonibus maximis contortuplicatis," which he attributes to *Gynocephalum,* seem to remove it to a considerable distance from our plant, if not to exclude it altogether from the family of *Artocarpeæ,* and to approximate it to *Morus* and its immediate allies.

The *Myrianthus* of M. Palisot de Beauvais has long since been pointed out by Mr. Brown† as approaching *Musanga* in habit, inflorescence and the structure of its male flowers; and its fruit as given in the "Flore d'Oware"‡ of that author, shown to be "so remarkable, with relation to its male flowers, that a knowledge of the female flowers is wanting to fix our ideas both of the structure and affinities of the genus." The male flowers are indeed so similar to those of the genera above characterized, and of *Musanga* in particular, that I add here their distinctive characters, with the double view of affording the materials for comparison, and of introdu-

* *Bijdr.* &c. p. 483. † Appendix to Capt. Tuckey's Narrative &c. p. 453. ‡ t. 12.

cing a correction in those given by M. de Beauvais, who describes them as having "Calyx quadrifidus" and "stamina 3," whereas in all those which I have examined the stamina have been equal in number to the segments of the 4-parted perianthium.

Myrianthus, *Pal. Beauv.*

Flores (ex Palisotio monœci). *Masc.* sessiles, densè capitati, capitulis lobatis paniculatis. *Perianthium* 4-partitum. *Stamina* 4, filamentis plùs minùs inter se cohærentibus. *Rudimentum pistilli* 0. *Fem.* . . . . . . Arbor (*Africæ Occidentalis*), foliis *longè petiolatis, digitatis, foliolis inæqualiter argutè serratis.* Stipulæ *spathiformes, convolutæ.* Flores masculi *in receptaculis crassiusculis ramosis, pedicellos* Hoveniæ dulcis *incrassatos e longinquo referentibus.*

Spec. exam. *Myrianthus arboreus,* Pal. Beauv. ♂, (in Herb. Banks., in Congo a b. Chr. Smith lect.)

In M. Gaudichaud's classification of Urticeæ*, *Cecropia* and *Coussapoa* are made to constitute a distinct tribe, under the name of *Cecropieæ*, forming part of his first section, or *Urticeæ veræ*. Further on, in a note to this tribe†, he refers to a plant, specimens of which were brought from Java by Commerson, and doubtingly classed with *Coussapoa*. Its male flowers are said to be "composés d'un calice à 4 divisions profondes (quelquefois 3—5); de 4 étamines (3—5), à filets élargis, droits, à anthères ovales, ayant sous ce rapport beaucoup d'analogie avec celles des *Cecropia*; d'un rudiment de pistil filiforme, obtus au sommet." There can be little doubt that these are the male flowers of *Conocephalus*; for although I have never seen more or less than 4 divisions of the perianthium and the same number of stamina, and Roxburgh and Blume make mention of no other number, Professor Lindley‡ figures only 3 in the specimens observed by him in the hothouse of the Comte de Vandes, and states that all those which he examined were certainly triandrous. It seems therefore that the genus is subject to occasional variation in the number of its parts of fructification. It should, however, be observed that M. Gaudichaud, who in a subsequent note§ refers to the figure of *Conocephalus* in the "Botanical Register," entirely overlooks its relation to Commerson's plant, with which I have presumed it to be identical, and places it in a tribe, which he proposes to form out of certain genera separated from *Morus* and *Broussonetia*, together with *Antiaris*; from all of which it is widely different.

At a considerable distance from his *Cecropieæ*, and forming part of his third section of *Urticeæ*, M. Gaudichaud places his tribe of *Artocarpeæ*, consisting of *Artocarpus* and *Perebea* of Aublet; to which he is inclined to add the *Bagassa* of the same author, and the *Hedycarya* of Forster. Of these genera *Perebea* and *Bagassa* are too imperfectly known to determine their position with any degree of certainty: the former seems, however, from the figure and description of Aublet‖, more nearly related to *Ficus*; and the latter, notwithstanding the resemblance of its fruit, as figured¶, to that of *Artocarpus*, is in habit and stipulation widely different. *Hedycarya* is much more nearly related to that very distinct division of the Class (as *Urticeæ* are now, in accordance with Mr. Brown's views, generally considered,) which was long since separated by Jussieu under the name of *Monimieæ*. I may here add that, according to Mr. Brown's observation, the *Zanthoxylum Novæ Zelandiæ* of M. Achille Richard ** is no other than the *Hedycarya dentata* of Forster, of which M. Richard appears to have observed the female only, and in fruit.

To return, however, to *Conocephalus*. The generic character here given differs in some degree from that of Dr. Blume, which had already been slightly modified by Professor Lindley. The perianthium instead of re-

* *Voyage de l'Uranie, Botanique*, p. 491. † Ibid. p. 506. ‡ Botanical Register, t. 1203 B.
§ l. c. p. 508. ‖ *Plantes de la Guiane*, p. 952. t. 361. ¶ Ibid. t. 376.
** *Voyage de l'Astrolabe, Flore de la Nouvelle Zélande*, p. 291. t. 33.

maining as at first merely lobed (as might be inferred from both the descriptions referred to) becomes finally divided nearly to its base. In the number of its divisions, and the corresponding number of the stamina, my observations, made on plants from Continental India, as well as from Java, coincide, as before noticed, with those of Roxburgh and Blume, and differ from those of M. Gaudichaud and Professor Lindley. These, however, are variations of no very essential importance. The embryo, described by Dr. Blume as exalbuminous, and by Roxburgh as furnished, in the recent seed, with a thin succulent albumen, would appear, at first sight, to offer a more important difference. But the albuminous lamella is in reality so thin, at least in dried specimens, so easily passed over unless very carefully sought for, and sometimes even so completely evanescent, as to afford no ground for surprise that it should have been overlooked in Dr. Blume's description. In other respects the characters, allowing for some difference in the terms, dependent chiefly on the different sense in which some of the parts are understood, are essentially the same. There cannot be a doubt, notwithstanding the apparent inapplicability of the generic name to heads of flowers almost perfectly globular, of the identity of the genus.

Neither can any doubt be entertained of the identity of our species with that of Dr. Blume, or with the plant figured in the "Botanical Register," notwithstanding the wide difference between the countries; which circumstance alone seems to have induced Professor Lindley, who had never seen Javanese specimens, to suggest that the continental plant was probably distinct. A careful comparison of specimens from Roxburgh and Dr. Wallich in the Banksian Herbarium at the British Museum, and in the noble collection presented by the Directors of the East India Company to the Linnean Society, with those collected by Dr. Horsfield, has satisfied me that no specific distinction exists between them. In all of these specimens, however distant the localities in which they were obtained, no other difference occurs than a gradual elongation of the outline of the leaves from ovato-subrotund to ovate, which appears to obtain equally in every situation, and can therefore hardly be regarded as constituting even a distinct variety*. It even appears doubtful whether the *Urtica ? superba* of Dr. Wallich's List, No. 4625, from Singapore, should be considered a distinct species. Other species of the genus are *Urtica globulifera*, Roxb.†, from Silhet, and *U. ? amœna*‡, Wall., from Penang.

Dr. Horsfield states that the male of *Conocephalus suaveolens* is called "in Javanese *Kallas*, the female *Gesto*; in Sundian the male is called *Kekejoan*, the female *Lokhsa*. It grows in shaded situations, near rivulets, but little above the level of the ocean, in many parts of the island. I collected it in the Preangan Regencies, in Banyumas, Pajittan, Kediri, Surabaya, &c. The stem is shrubby or subarborescent, decumbent, covered with a rough, warty, slightly grooved, gray bark, and divided near the earth into numerous branches, which spread horizontally, twining diffuse and irregularly between the shrubs and underwood of the forest, and rarely ascending to any considerable height."

Tab. XII. *Fig.* 1. A branch of *Conocephalus suaveolens* ♂, of the natural size. *Fig.* 2. A male flower magnified. *Fig.* 3. Its perianthium laid open. *Fig.* 4. Its stamina with the rudiment of the pistillum. *Fig.* 5. A single stamen, more highly magnified. *Fig.* 6. A female flower, with its pedicellus. *Fig.* 7. The same, with the perianthium removed. *Fig.* 8. The perianthium laid open. *Fig.* 9. The ripe fruit. *Fig.* 10. The same with its pulpy covering removed. *Fig.* 11. The seed. *Fig.* 12. The embryo. *Fig.* 13. The same, with one of its cotyledons seen separately.

---

* Among Father Kamel's drawings in the British Museum, is one which is evidently a representation of the present species, and which therefore extends its range as far as the Island of Luçon. Of this plant the name only, "*Litir*," is given in Ray's Syllabus of Kamel's plants, in the Appendix to the third volume of his "Historia Plantarum," p. 86, No. 25; but the drawing is accompanied with a short description, the concluding portion of which adds the following information concerning it: "sarmentis aquâ limpidâ scatentibus, itinerantibus solatio."

† *Fl. Indica*, 3, p. 593. ‡ List, No. 4626.

ANTIARIS TOXICARIA, *Lesch.*

TAB. XIII.

ANTIARIS *toxicaria,* involucri masculi laciniis ovatis perianthiorum longitudine reflexis.

Ipo toxicaria, *Pers. Syn.* 2. p. 566. *ex descr. Deschamps.*
Antiaris toxicaria, *Lesch. in Ann. Mus.* 16. p. 478, t. 22.—*Blume, Rumph.* p. 56, t. 22, 23.

DESCR. Arbor procera. Folia in ramulis sterilibus rufo-hirtis 6—8 pollices longa, $2\frac{1}{2}$—$3\frac{1}{4}$ lata, oblongo-elliptica, basi cordata, apice plerumque breviter acuminata, suprà atro-viridia lucidula, punctis numerosissimis albidis setulas breves adpressas exserentibus scabra, infrà pallidiora, pilis rufescentibus velutino-tomentosa, nervis petiolisque brevissimis rufo-hispidis: in ramulis fertilibus plùs minùs lævigatis minora, 2—5 pollices tantùm longa, 1—$2\frac{1}{2}$ pollices lata, formâ et superficie tamen ferè similia, nisi quod setæ paginæ superioris glandulis basilaribus ferè orbatæ, emarginatura folii baseos minùs conspicua vel plerumque deficiens, petiolusque pro folii ratione longior. Flores masculi densè capitati, capitulorum pedunculis binis vel ternis in racemo abbreviato quasi fasciculatis, axillaribus, pollicaribus, hispidis. Capitulum hemisphæricum, magnitudine pisi majoris, involucratum; involucro pubescente, in receptaculum demùm convexum explanato, apice multifido, laciniis brevibus, ovatis, perianthia longitudine æquantibus, eorumque foliolis subsimilibus. Perianthia in receptaculo sessilia, numerosissima, 4-phylla, foliolis ad basin usque distinctis, spathulatis; apicibus subovatis hispidis inflexis stamina imbricatim obtegentibus. Stamina 4. Filamenta brevissima. Antheræ ovales, biloculares, polline minuto lævi subgloboso repletæ. Pistilli rudimentum nullum. Flores feminei (in speciminibus mihi obviis) a masculis remoti sed in iisdem ramulis, axillares, solitarii, involucrati, breviter pedicellati, pedunculo involucroque ovato apice dorsoque breviter multifido velutinis. Perianthium nullum. Pistillum cum involucro accretum, uniloculare, uniovulatum; ovulo ex apice ovarii pendulo. Stylus brevissimus. Stigmata duo, longitudine fere ovarii, reflexa, suprà glanduloso-villosa. Fructus drupaceus, ovalis, semunciam longus, involucro aucto carnoso laciniis ferè obsoletis tectus, sericeo-velutinus. Putamen in fructu maturo liberum, apice affixum, ex ovuli membranis formatum, læve, chartaceum, fragile, ovatum, 4 lineas longum, laminâ exteriore tenuiore albidâ, interiore fuscescente. Embryo maturus in putaminis cavitate liber, albumine nullo donatus. Cotyledones obovatæ, plano-convexæ, crassæ, superficie rugosæ. Radicula supera, scilicet hilo proxima.[1]



ANTIARIS TOXICARIA

Many of the older travellers and naturalists who visited the islands of the Indian Archipelago, or wrote on their productions, make mention of a tree growing in the kingdom of Macassar, in the Island of Celebes, and producing a poisonous juice of the most deadly character. The first published account of this poison, so far as I am aware, is contained in De Bry's "India Orientalis*;" and the particulars there given are repeated somewhat more in detail in Sir Thomas Herbert's Travels†, and in the work of Bontius‡, given to the world by Piso in 1658, nearly thirty years after the death of its author. The sum of these several statements is, that the natives of Macassar make use of a substance to poison small darts, (which are discharged through a tube,) so fatal in its effects, that a slight wound, even in the heel, just sufficient to draw blood, not only produces immediate death, but renders the flesh within half an hour so putrid as to separate from the bones on the mere application of the hands. This, adds Bontius, is no idle invention, but depends on the ocular experience not only of our own countrymen (the Dutch), but also of the English and the Danes.

Common report had not failed to spread abroad the rumour of this deadly poison; and in the Philosophical Transactions§ for March 1666, we find among the "Enquiries for Suratte and other parts of the East Indies," the following questions: "Whether it be true, that the onely antidote hitherto known against the famous and fatal Macassar poyson, is humane ordure, taken inwardly? and what substance that poison is made of?"; and further, "Whether there be such a vegetable in Java, called *Mangas bravas*‖, that is so poysonous, that it kills presently, and for which no remedy hath yet been found?"

Shortly after this Herport¶, an artist, and Saar**, a soldier, published accounts of their travels among the Indian Islands, in which the statement implied by the first of the above questions is distinctly affirmed; with the addition of another remedy, which had sometimes proved successful, viz. the immediate excision or amputation of the wounded part. The former writer speaks of the poison as in use among the Javanese: the latter, who was an eye-witness of its effects upon several of his fellow-soldiers, states it to be the produce of a tree growing in Macassar, and much in use among the natives of Banda, who caused great havoc among the Dutch soldiers by its employment.

Tavernier††, in 1676, gives a much more explicit account of the poison and its effects. He states it to be the produce of certain trees growing in the Island of Borneo, and capable of being so tempered as to shorten or prolong the sufferings of the victim. He relates an instance in which the king of Macassar being desirous of exhibiting to his (Tavernier's) brother the effects of the poison, desired the latter to indicate in what part of a criminal about to be executed by its means, the wound should be inflicted; and the great toe of the right foot being chosen, although two surgeons, one English and the other Dutch, stood by and immediately amputated the toe far above the wound, they could not perform the operation with sufficient rapidity to prevent the poison from spreading to the heart, and causing almost instant death. A number of poisoned arrows presented to the Dutch envoy by the King of Acheen several years previously to Tavernier's visit, still retained their poisonous quality to such a degree, that squirrels which were shot with them fell dead instantly.

The first attempt at a description of the tree from which the poison is derived was given by Nieuhof‡‡, in 1682, accompanied by a plate representing several natives of Macassar in the act of blowing poisoned arrows through tubes. He represents the poison as the sap which flows from the bark of a tree growing in the interior of the Island (as he calls it) of Macassar, and in three or four of the neighbouring islands inhabited by the Bugis. This

* Pars 8, p. 81, 16.

† Relation of some Yeares Travaile, Lond. 1634, p. 199.

‡ *Historia Naturalis et Medica Indiæ Orientalis*, p. 85.

§ Vol. i. p. 417.

‖ The *Mangas bravas* is believed to be the *Cerbera Manghas* of Linnæus, the fruit of which is said to be poisonous. It is probably owing to a similar confusion that Bosc, in the *Nouveau Dictionnaire d'Histoire Naturelle*, asserts the Upas to be a species of *Cerbera*.

¶ *Kurtze Ost-Indianische Reise-beschreibung*, 1669, p. 26.

** *Ost-Indianische Funfzehen-Jährige Kriegs-dienste*, 1672, p. 46, 47.

†† Voyages, Part II. p. 438—9.

‡‡ *Zee en Lant-Reize door verscheide Gewesten van Oost-Indien*, p. 217.

tree is stated to agree with the clove-tree in height, and to have somewhat similar leaves; and statements are made with respect to the poison and its supposed antidote similar to those which appear from the preceding notices to have been generally current at the time.

In 1685, further information of a similar character was communicated to the German Academia Naturæ Curiosorum by Dr. Andrew Cleyer*, who received it from Cornelius Spielman, formerly the Dutch commander-in-chief in their Indian possessions. He adds to the statements previously published, which he entirely adopts, some apocryphal details with respect to the sterility of the ground in the vicinity of the poison-trees, which is said for a considerable distance round to produce neither grass nor any other vegetable. In procuring the poison, long bamboo rods, furnished with sharp points, are stated to be used to pierce the tree, lest those who collect it should come in contact with the juice, which would stiffen and contract their joints. In the hollow of these canes the poison becomes hardened; and its subsequent preparation consists in its mixture with water, in which the herb called Lampoyang had been previously macerated. With regard to this preparation the author enters into some details; and states that only a few of the natives possess the secret of selecting the strongest and most efficacious poison.

Father Gervaise†, who resided in Macassar for several years, affirms with characteristic credulity that the mere touch or smell of some of the poisons prepared by the natives is sufficient to produce death. The effect of their poisoned weapons is so immediate that there is no time to apply a remedy; and their arrows are capable of producing the same effect twenty years after having been charged with the poison, which can only be rendered innoxious by subjecting them to the effects of smoke.

Among the "Descriptiones Fruticum et Arborum Luzonis a Rev^{do} Patre Georgio Josepho Camello, S. J. ad Jacobum Petiverum, Pharmac. Londinens. missæ, anno 1701," which form part of the Appendix to the third volume of Ray's "Historia Plantarum," published in 1704, we find the following account of the tree in question‡. "Ipo seu Hypo arbor est mediocris, folio parvo et obscurè virenti, quæ tam malignæ et nocivæ est qualitatis, ut omne vivens umbrâ suâ interimit, unde narrant in circuitu et umbræ distinctu plurima ossium mortuorum hominum animaliumve videri. Circumvicinas etiam plantas enecat, et aves insidentes interficere ferunt, si Nucis Vomicæ Igasur plantam non invenerint, qua reperta vita quidem donantur, et servantur, sed defluvium patiuntur plumarum. Antonius Molero mihi retulit, post iter per sylvosam viam, passum fuisse defluvium capillorum unius lateris, an forsan ex hac arbore? Hypo lac Indi Camucones, et Sambales, Hispanis infestissimi, longis excipiunt arundineis perticis, sagittis intoxicandis deserviturum, irremediabile venenum, omnibus aliis alexipharmacis superius, præterquam stercore humano propinato." In this extract we have the first indication of the tree by its native name, and a slight attempt at its description, mixed up with the usual fables, and with some others not previously noticed. Father Kamel suggests, and with great probability, that this may be the tree concerning which a still more absurd fiction is told by Argensola§, who in his Chronicle, published at Madrid in 1609, asserts that there grows a tree in the Island of Celebes, of very large size, which if any one approaches on the western side, he sleeps and dies; while the self-same sleep proves an antidote to those who approach it within four palms distance on the east.

Kæmpfer's‖ account, published in 1712, with more details on the subject of the tree, and the mode of collecting its poisonous juice, combines a still larger mixture of fable; given, however, on the authority of the natives, of whose veracity he seems to have entertained strong doubts. To the Macassar name of Ipû, he adds the Malay and Javanese name of Upà, then for the first time, as far as I have observed, given to the world. He speaks of three varieties or species, differing in the degree of malignity of their juice, and in its colour when dried. The

* *Miscellanea Curiosa Acad. Nat. Cur., Dec.* 2, *Ann.* 3, p. 127, &c.

† *Déscription Historique du Royaume de Maçaçar*, Paris, 1688, p. 45.

‡ p. 87.

§ *Conquista de las Islas Malucas*, p. 72.

‖ *Amœnitates Exoticæ*, p. 575.

collection of the genuine sort, which grows only in Macassar, exposes those who are engaged in it to the most imminent peril. In search of the tree they are compelled to penetrate places infested with thickets and wild beasts; and when it is found, unless it be pierced from a distance and to windward, the aggressors would quickly be suffocated by its noxious effluvia. The same fate is said to befall birds which fly over a recently wounded tree. Its collection is therefore intrusted to those who are condemned to death for their crimes, on the understanding that their sentence will be remitted if they return with the poisonous juice. A minute account is then given of the precautions adopted to secure them in their dangerous errand; and it is stated that on their return, freed by their exploit from all punishment and from all danger, they offer up this ransom of their lives to the king. "Ita," he proceeds, "narrarunt mihi populares Celebani, hodiè Macassari dicti. Quis autem quicquam ex Asiaticorum ore referat, quod figmentis non implicetur?" He next describes the poisoned weapons used by the Macassar chiefs, and alludes to the antidote so often noticed as the only one which the Dutch were aware of, until by torture,—by which means alone they could obtain the information,—they extorted from the natives the knowledge of another and more efficacious remedy, the "radix Mungo."

In 1716, Michael Bernhard Valentin reprinted in his "India Literata" Spielman's narrative*, as contained in the "Miscellanea Curiosa," and added a dissertation by Lochner†, chiefly founded on the work of Kæmpfer just quoted, and containing an abstract of the testimonies of Bontius, Nieuhof, Tavernier and Kæmpfer concerning the Macassar poison, of which it consequently gives by far the most complete account that had then been published.

Ten years afterwards Francis Valentyn, in the third volume of his laborious work on the East Indies, containing his account of Amboyna and the neighbouring islands, appended to his description of the poison-tree of Macassar ‡ a miniature figure (the first that had been given to the world) of what he calls the male plant, which purports to have been taken from a specimen obtained by him in 1688. A comparison of this figure with that given in the work of Rumphius will show that (like most, if not all, of the plants of Valentyn) it is only a diminished and mutilated copy of the drawing which was subsequently made use of in the latter work. A figure of the female, indicated in the text, does not appear. Nearly all that is said by Valentyn appears also to have been abridged from Rumphius's MS., with the exception of a narrative of the execution of four criminals by means of a criss poisoned with the deleterious juice, which he relates as an eye-witness. Two of these he states to have been slightly wounded in the thumb, and the other two in the great toe; and all fell speedy victims, notwithstanding that the arms of the former and the legs of the latter were immediately amputated, in order to prove the inefficacy of such an operation. In this, it will be observed, Valentyn fully confirms the statement of Tavernier previously given.

In 1750, nearly half a century after the death of its author, appeared the second volume of Rumphius's "Herbarium Amboinense," which contains the most detailed account§ that he was enabled to procure of the poison in question, of the tree from which it was obtained, and of the mode adopted by the natives in preparing it for use. Under the name of "Arbor Toxicaria, Ipo," to which he adds the Malayan synonym of Upas, he describes and figures a specimen without flower or fruit, obtained by him from Macassar in 1691, which he states himself to have had great difficulty in procuring, on account of the jealousy of the natives. Besides the Island of Celebes, he indicates it as growing in Sumatra, Borneo and Bali. A considerable portion of his account is occupied by the statements of the natives, given in nearly the same terms with those employed by preceding writers, but in greater detail, with respect to the precautions necessary in collecting the juice, the different degrees of intensity in the poison, its mode of preparation, its effects, and the antidotes supposed to be capable of resisting it. Of the latter he adds several, a knowledge of which he states to have been obtained from the native women by

* p. 434, *et seq.*

† p. 534, *et seqq.*

‡ *Oost-Indien, Deel* 3, p. 218. f. 51.

§ p. 263, *et seqq.* t. 87.

blandishments or torture. His own experience seems to be confined to the effects of the poison which he had witnessed in the wounded soldiers, and to the precautions taken by them to secure themselves against it. A fruit obtained in 1694 as that of the poison-tree, and added to the figure, has certainly no relation to it.

All the accounts of the Upas hitherto noticed properly belong to the seventeenth century; and no observations respecting it seem to have been recorded during the greater part of the eighteenth. Towards the close of the latter, however, there appeared in the "London Magazine*" one of the most impudent fabrications that has ever been successfully palmed on popular credulity. *N. P.* (as he is called in the heading to the article), or *J. N.* Fœrsch (as the name is subscribed at its termination), who had formerly been a surgeon in the employment of the Dutch East India Company at Samarang in the Island of Java, and was then, as it is stated, in the same capacity on board an English vessel, drew up an account of the poison-tree, which purports to have been translated into English by "Mr. Heydinger, formerly a German bookseller near Temple-bar," and was received by the editor of that periodical not without some suspicion in regard to a part of the statement, but with an expression of confidence in the truth of the remainder. Of this account it may be sufficient to say, that it embraces an exaggerated version of all the marvellous stories current among the natives, not, however, given upon their authority, but as the result of his own cautiously-conducted investigations; and mixed up with a minuteness of detail as to time, place and circumstances, calculated to give an air of credibility to the gross falsehoods of which it almost entirely consists. One fact, however, is added to the history of the tree, even in this most impudent fabrication, namely, that it grows in the Island of Java†.

The sensation created by the publication of this extraordinary piece of fiction (which was copied into many of the English and translated in various foreign journals during the two or three succeeding years) was not a little heightened by its adoption, in the year 1789, in Darwin's "Loves of the Plants;" a poem highly popular at the

---

* December, 1783, p. 511, &c.

† Nearly all the quotations of Fœrsch's Narrative refer to the "Universal Magazine" as the original source, but this is incorrect: the story made its first appearance in the "London Magazine" for December 1783, and was thence copied, with some omissions, into the "Universal Magazine" for February 1784. As one of the most striking contradictions in the refutation afterwards published by a commission of the Batavian Society was founded on one of the passages omitted in the latter, and I was then ignorant of the existence of the paper in the "London Magazine," I was for some time at a loss how to account for this circumstance, and was led to suspect that the Dutch version in the "Niewe Vaderlandsche Leteroefningen," which I had not been able to procure, and against which the refutation was directed, might be the actual original. On mentioning my doubts to Dr. Horsfield, he was so kind as to write to Prof. Reinwardt at Leyden, requesting him to refer to the Dutch periodical in order to ascertain if this were really the fact. In the mean time, however, I met with the article in the "London Magazine," and the note of the editor above referred to dispelled all doubt of its being the earliest publication. Professor Reinwardt took much pains to ascertain the facts, and very kindly communicated the result of his inquiries in a long and interesting letter to Dr. Horsfield, from which it appears that two different translations from the English, but without accurate indication of their immediate source, were given in two Dutch periodicals, the "Niewe Nederlandsche Bibliotheek," and the "Niewe Vaderlandsche Leteroefningen." From the variations between the two versions noticed by Prof. Reinwardt it is evident that the former was taken from the "Universal," and the latter from the "London Magazine." In connexion with the subject Dr. Reinwardt has furnished a detailed abstract of the refutation by the Batavian Commission, subsequently published in the last-named Dutch periodical, of which some account is given in the text from the German version in the Leipzig "Sammlungen." He suspects from some peculiarities in his orthography (the commutation of *b* and *p*, and of *d* and *t*,) that Fœrsch was a German, and the name may be supposed to corroborate this idea; but these circumstances may depend on Heydinger's having received his statement orally and not in writing, and may also tend to confirm the suspicion, very prevalent at the time, that the latter had a greater share in the fabrication of the story than he was willing to admit. Prof. Reinwardt also mentions two factitious engravings, published in France, on the authority of Fœrsch's narrative, representing the supposed departure of the criminal in quest of the poison, and the locality of the tree, with the mode of collecting its juice. For these particulars, for the pains which he took in elucidating the subject, and the ready kindness with which he communicated the result of his inquiries, I beg Prof. Reinwardt to accept my best thanks.

time of its first appearance, and of which the fable of Fœrsch, embellished with all the artifices of a florid style of versification, constituted one of the most striking and effective passages*. Although warned of the falsehood of the statement, the poet was stronger in him than the philosopher: he could not consent to lose or mutilate so fine a digression; and the name of the Upas is consequently inseparably associated with the poem, in which its fictitious history is "damn'd to everlasting fame."

In the mean time Thunberg, whose recollections of the Macassar poison appear to have been awakened by a Swedish translation of Fœrsch's narrative, had also published in 1788, under the name of his pupil Aeimelæus, a Dissertation, "De Arbore Toxicariâ Macassariensi," which is, however, little else than an abstract of the statements contained in the work of Rumphius, with an occasional reference to Fœrsch, of whose veracity, nevertheless, he seems to have been justly sceptical.

Shortly after the appearance of Fœrsch's narrative, the Batavian Society deputed two of its members, MM. Van Rhyn and Palm, to investigate the allegations contained in it. The result of their inquiries was published in the "Niewe Algemeene Vaderlandsche Letteroefningen" for 1789; for which reason it was omitted in the fifth volume of the Society's Transactions, published in the following year†. I have not seen the original Dutch, but a German translation was given in the Leipzig "Sammlungen zur Physik und Naturgeschichte" under the date of 1788‡, and was reprinted in Usteri's "Annalen für die Botanik", and other periodicals of the day. In this report, not only are nearly all the leading circumstances introduced by Fœrsch to give a colour to his narrative proved to be destitute of any foundation in fact, but it is even attempted to deny the very existence of such a tree as the Upas in the island.

In 1793, Lord Macartney's Embassy to China visited Batavia on its route; and while there several of the gentlemen connected with the mission made inquiries respecting the Upas. The result of those inquiries was merely negative; and both Sir George Staunton§ and Mr. Barrow‖, but more particularly the latter, appear to have derived from those with whom they conversed on the subject a strong impression that the relation was altogether fabulous.

Labillardière, who visited the island in the following year with D'Entrecasteaux's unfortunate expedition in search of La Perouse, was equally unsuccessful in his inquiries. Nothing, I believe, is said on the subject in his own narrative of the voyage; but Deleuze states, in the notes to his translation of Darwin's poem¶, that he had been informed by M. Labillardière that during his stay in Java he never heard the Upas mentioned, and that the marvels related concerning it appeared to him to be pure reveries.

Another naturalist, however, attached to the same expedition, who remained for several years in Java in the employment of the Dutch Government, M. L. A. Deschamps, was more successful in his researches. I have now before me (by the kindness of Mr. John Reeves, by whom they were lately purchased at a sale at the India House) a series of original drawings and manuscripts prepared by this traveller during his residence in Java, among which are representations of the Upas, in flower and fruit, with the native name of Antiar, and a short and very imperfect character. After his return to France he communicated to the "Annales des Voyages"** a Notice of the Pohon Upas or Poison-tree, extracted from his unpublished Travels, the substance of which was afterwards given by M. Malte Brun in a note on his translation of Barrow's Voyage to Cochin China, whence it was extracted by Sonnini, who appended it in the form of a note to the narrative of the Travels of M. La Tombe. This last-named traveller states†† that he had been unable, in the course of his journey from Balamboang to Sourabaya, and along the whole northern coast of Java, to gather any information on the subject. M. Deschamps, on the contrary, describes the Pohon Upas as a tree growing not uncommonly in the forests of Balamboang, and

* Loves of the Plants, part 2, ed. 2. p. 114.

† *Verhandeling van het Bataviaash Genootschap*, Deel 5. p. 22.

‡ vol. iv. p. 439, *et seqq.*

§ Embassy, Lond. 1797, vol. i. p. 272, &c.

‖ Voyage to Cochin China, Lond. 1806, p. 191, &c.

¶ Paris, an 8, p. 335.

** *Annales des Voyages*, tom. i., Paris, 1808, p. 69, *et suiv.*

†† *Voyages aux Indes Orientales*, Paris, 1810, p. 282.

no more dangerous by its vicinage than other poisonous vegetables. He passes slightly over the mode of preparation of its inspissated juice, obtained by means of an incision in the bark, and states that if introduced into the circulation by the slightest wound it proves instantly fatal, although the natives feed with impunity on animals killed by arrows impregnated with the poison. He describes the tree as growing to a height of thirty or forty feet, and having the habit and foliage of an elm; its leaves being alternate, petiolate, oval, and rough to the touch, and its flowers axillary, both male and female growing on the same tree. The male flower consists of a rounded receptacle, truncate above, and covered with innumerable stamina, nearly as in *Dorstenia*; and the female resembles a budding fig: it consists merely of an ovary surmounted by two styles, and is succeeded by a round fruit inclosing a nucleus of the same form, which the author had not seen at its maturity. He refers to the supposed remedies for the deadly effects of its poison; and adds, that the mere atmosphere of the tree is far from being so pernicious as it had been represented, he himself having cut branches from it with impunity. The fables related concerning it may, he thinks, be explained by transferring the odium to the marshy and unwholesome exhalations of a low island on the southern coast to which, he says, state criminals, and especially those of the highest class, are sometimes banished, and where they speedily die of malaria, and not, as the vulgar believe, of the emanations of the Pohon Upas.

The botanical part of this information appeared, on the authority of M. Deschamps, in 1807, in Persoon's "Synopsis Plantarum*," with the unwarranted addition of serratures to the leaves.

In 1810 M. Leschenault, who had also been for some time resident in Java, published in the "Annales du Muséum d'Histoire Naturelle†," a long and interesting memoir on the *Strychnos Tieute* and *Antiaris toxicaria*. Of these plants he gives botanical descriptions; but his specimens of the former being without flower or fruit, the determination of the genus, however probable, could not be regarded as final‡. Both of them furnish poisons, the former the most deadly. M. Leschenault describes the mode of preparation, and mentions some experiments made during his stay in Java on their effects, which are, however, superseded by the more complete series instituted by MM. Magendie and Delile on the poisons brought home by him; a detailed account of which was given in several memoirs read before the Institute and the Faculty of Medicine in Paris. He states his specimens of the Antiar to have been obtained from a tree measuring more than 100 feet in height, and 18 feet in circumference at the base of the trunk; and adds that some precautions, although not such as had been asserted, are necessary to be observed in the collection. Its botanical affinity he conceives to be in the neighbourhood of *Brosimum*.

The third edition of Mr. Marsden's "History of Sumatra§," published in 1811, adds that island to the list of habitats in which the Upas has been discovered. The information is given on the authority of Mr. Charles Campbell, of the Medical Establishment at Bencoolen, who states that he had found the tree in the country at the back of Bencoolen, and had forwarded a packet of its seeds to Kew. Mr. Marsden further states, that "a small branch of the *puhn upas*, with some of the poisonous gum, was brought to England in 1806 by Dr. Roxburgh, who informed Mr. Lambert that a plant of it, which he had procured from Sumatra, was growing rapidly in the Company's Botanic Garden at Calcutta." "A specimen of the gum," Mr. Marsden continues, "by the favour of the latter gentleman is in my possession." The specimens without fructification from the Calcutta garden, brought home by Dr. Wallich||, were probably obtained from the plant referred to by Roxburgh.

On this specimen Mr. (now Sir Benjamin) Brodie, who was then engaged in an inquiry into the effects of vegetable poisons, instituted several experiments, which are detailed in a paper published in the "Philosophical Trans-

---

* tom. ii. p. 566. † tom. xvi. p. 459, *et suiv.*

‡ It is, however, adopted by Dr. Blume, who characterizes the fruit in his "Bijdragen," p. 1019; and is proved to be correct by the figure of the plant, with the details of its flower and fruit, given by the same author in his "Rumphia", t. 24.

§ p. 110, 111. || List, No. 7494.

actions" for 1811*. These experiments entirely agree with those which Dr. Horsfield had previously made in Java, and prove to Mr. Brodie's satisfaction "that the Upas antiar, when inserted into a wound, produces death by rendering the heart insensible to the stimulus of the blood, and stopping the circulation." The convulsions accompanying its action he regards as a subordinate and secondary symptom, and not as the result of any direct action of the poison upon the brain and nerves.

In the year 1812 Dr. Horsfield communicated to the Society of Arts and Sciences at Batavia, "an Essay on the Oopas or Poison-tree of Java," which forms part of the seventh volume of the Transactions of that Society, published in 1814. As this publication is but little known in Europe†, and the account of the tree there given is far more complete than that of any other writer,—containing, in fact, all the authentic information which Dr. Horsfield was enabled to collect on the spot, during a period of six years from the time when it was first observed by him,—it seems advisable to extract at length those passages which have reference to the appearance of the tree, its œconomical uses, and the districts and localities in which it is found.

"The Antshar," says Dr. Horsfield‡," "is one of the largest trees in the Forest of Java. The stem is cylindrical, perpendicular, and rises completely naked to the height of sixty, seventy or eighty feet. Near the surface of the ground it spreads obliquely, dividing into numerous broad appendages or wings, much like the *Canarium commune* and several others of our large forest trees. It is covered with a whitish bark, slightly bursting in longitudinal furrows: near the ground this bark is, in old trees, more than half an inch thick, and upon being wounded, yields plentifully the milky juice from which the celebrated poison is prepared. A puncture or incision being made in the tree, the juice or sap appears oozing out, of a yellowish colour (somewhat frothy) from old trees, paler and nearly white from young ones: when exposed to the air its surface becomes brown. The consistence very much resembles milk, only it is thicker and viscid. This sap is contained in the true bark (or *cortex*), which when punctured yields a considerable quantity, so that in a short time a cupful may be collected from a large tree. The inner bark (or *liber*) is of a close fibrous texture, like that of the *Morus papyrifera*, and when separated from the outer bark, and cleansed from the adhering particles, resembles a coarse piece of linen. It has been worked into ropes, which are very strong, and the poorer class of people employ the inner bark of younger trees, which is more easily prepared, for the purpose of making a coarse stuff, which they wear when working in the fields. But it requires much bruising, washing, and a long immersion in water before it can be used; and even when it appears completely purified, persons wearing this dress, on being exposed to rain, are affected with an intolerable itching, which renders their flimsy covering almost insupportable.

"It will appear from the account of the manner in which the poison is prepared, that the deleterious quality exists in the gum, a small portion of which still adhering to the bark, produces, when it becomes wet, this irritating effect; and it is singular that this property of the prepared bark is known to the Javanese in all places where the tree grows (for instance, in various parts of the provinces of Bangil and Malang, and even at Onarang), while the preparation of a poison from its juice, which produces a mortal effect when introduced into the body by pointed weapons, is an exclusive art of the inhabitants of the eastern extremity of the island.

"One of the Regents in the eastern districts informed me that having, many years ago, prepared caps or bonnets from the inner bark of the Antshar, which were stiffened in the usual manner with thick rice-water, and handsomely painted, for the purpose of decorating his mantries, they all decidedly refused to wear them, asserting that it would cause their hair to fall out.

"The stem of the Antshar having arrived at the before-mentioned height, sends off a few stout branches, which spreading nearly horizontally, with several irregular curves, divide into smaller branches, and form a hemispherical

* p. 196, &c.

† The Essay on the Oopas was, however, reprinted in Thomson's Annals of Philosophy, vol. ix. p. 202 & 265; and large extracts from it have also been given in Sir Stamford Raffles's History of Java, vol. i. p. 44, &c., *note*.

‡ l. c. p. 9, &c.

but not very regular crown. The external branches are short, have several unequal bends, and are covered with a brown bark."—"The wood is white, light, and of a spongy appearance."

"Previous to the season of flowering, about the beginning of June, the tree sheds its leaves, which reappear when the male flowers have completed the office of fecundation. It delights in a fertile and not very elevated soil, and is only found in the largest forests. I first met with it (the Antshar) in the Province of Poegar, on my way to Banjoowangee; in the Province of Blambangan I visited four or five different trees, from which this description has been made, while two of them furnished the juice for the preparation of the Oopas*. The largest of these trees had, where the oblique appendages of the stem entered the ground, a diameter of at least ten feet, and where the regularly round and straight stem began, its diameter was full three feet. I have since found a very tall tree in Passooroowang, near the boundary of Malang; and very lately I have discovered several young trees in the forests of Japara, and one tree in the vicinity of Onarang. In all these places, though the inhabitants are unacquainted with the preparation and effect of the poison, they distinguish the tree by the name of Antshar. From the tree I found in the Province of Passooroowang I collected some juice, which was nearly equal in its operation to that of Blambangan. One of the experiments to be related below was made with the Oopas, prepared by myself after my return to the chief village. I had some difficulty in inducing the inhabitants to assist me in collecting the juice, as they feared a cutaneous eruption and inflammation, resembling, according to the account they gave of it, that produced by the Ingas of this island, the *Rhus vernix* of Japan, and the *Rhus radicans* of North America: but they were only affected by a slight heat and itching of the eyes. In clearing the new grounds in the neighbourhood of Banjoowangee for cultivation, it is with much difficulty the inhabitants can be made to approach the tree, as they dread the cutaneous eruption which it is known to produce when newly cut down. But except when the tree is largely wounded, or when it is felled, by which a large portion of the juice is disengaged, the effluvia of which, mixing with the atmosphere, affect the persons exposed to it with the symptoms just mentioned, the tree may be approached and ascended like the other common trees in the forests.

"The Antshar, like the trees in its neighbourhood, is on all sides surrounded by shrubs and plants: in no instance have I observed the ground naked or barren in its immediate circumference. The largest tree I met with in Blambangan was so closely environed by the common trees and shrubs of the forest in which it grew, that it was with difficulty I could approach it. Several vines and climbing shrubs, in complete health and vigour, adhered to it and ascended to nearly half its height; and at the time I visited the tree and collected the juice, I was forcibly struck with the egregious misrepresentations of Fœrsch. Several young trees, spontaneously sprung from seeds that had fallen from the parent, reminded me of a line in Darwin's 'Botanic Garden,'—'Chain'd at his root two scion demons dwell;'—while in recalling his beautiful description of the Oopas, my vicinity to the tree gave me reason to rejoice that it is founded on fiction."

In addition to the botanical description of the Antshar, and an account of the Tshettik (the *Strychnos Tieute* of Leschenault), Dr. Horsfield's paper contains an account of the mode of preparation of both poisons, the Antshar and the Tshettik, as performed by an old Javanese, celebrated for his superior skill, together with the detailed recapitulation of a series of experiments instituted with a view to ascertain the manner in which they respectively act upon the animal œconomy. It is needless to enter here into any detail on this branch of the subject; but some of the general results of the insertion and administration of the Antshar, as stated by Dr. Horsfield, may with propriety be given. "The rapidity of its effect," he says†, "depends in a great degree on the size of the vessels wounded, and on the quantity of poison carried into the circulation. In the first experiment it induced death in twenty-six minutes; in the second, which was made with the sap collected in Poegar, in thirteen minutes. The poison from different parts of the island has been found nearly equal in activity. In the ninth experiment (with the poison from Passooroowang) death followed in twenty-nine minutes. The common

* This visit, as appears from an account of Dr. Horsfield's Journey into the Eastern Provinces of Java in the same volume, and a subsequent passage at p. 36, was in the month of July, 1806.

† p. 48, &c.

train of symptoms is, a trembling and shivering of the extremities, restlessness, erection of the hair, discharges from the bowels, drooping and faintness, slight spasms and convulsions, hasty breathing, an increased flow of saliva, spasmodic contractions of the pectoral and abdominal muscles, retching, vomiting, excremental vomiting, frothy vomiting, great agony, laborious breathing, violent and repeated convulsions, death. The effects are nearly the same on quadrupeds in whatever part of the body the wound is made. It sometimes acts with so much force that not all the symptoms enumerated are observed: in these cases, after the premonitory symptoms (tremors, twitchings, faintness, and an increased flow of saliva,) the convulsions come on suddenly, and are quickly followed by death." In all these experiments the wounded animals were dogs; but "the Oopas appears to affect different quadrupeds with nearly equal force, proportionate in some degree to their size and disposition. To dogs it proved mortal in most experiments within an hour; a mouse died in ten minutes, see Exper. 8th; a monkey in seven minutes, see Exper. 11th; a cat in fifteen minutes, see Exper. 12th. A buffalo, one of the largest quadrupeds of the island, died in two hours and ten minutes, see Exper. 13th. I do not think the quantity of poison introduced in this experiment was proportioned to that which was thrown into the system in the experiments on smaller animals; the dart fell from the wound before a sufficient quantity had been taken into the circulation to produce a rapid effect." Taken into the stomach of a dog, the Antshar "produced at first nearly the same symptoms as a puncture; oppression of the head, twitchings, faintness, laborious respiration, violent contraction of the pectoral and abdominal muscles, an increased flow of saliva, vomiting, great restlessness and agony, &c., which continued nearly two hours; but after the complete evacuation of the stomach by vomiting, the animal gradually recovered."

"In animals killed by the Antshar, the large vessels in the thorax, the aorta and venæ cavæ, were in every instance found in an excessive degree of distention: the viscera in the vicinity of the source of circulation, especially the lungs, were uniformly filled in a præternatural degree with blood, which in this viscus and in the aorta still retained a florid colour, and was completely oxygenated. On puncturing the vessel it bounded out with the elasticity and spring of life. The vessels of the liver, of the stomach and intestines, and of the viscera of the abdomen in general, were also more than naturally distended, but not in the same degree as those of the breast. In the cavity of the abdomen a small quantity of serum was sometimes effused. The stomach was always distended with air, and in those instances in which the action of the poison was gradual, and in which vomiting supervened in the course of the symptoms, its internal coat was covered with froth. The brain indicated less of the action of the poison than the viscera of the thorax and abdomen. In some instances it was perfectly natural, in others marks of a small degree of inflammation were discovered."

It may be observed that the Tshettik, a poison far more rapid and violent in its effects, whether inserted into a wound or internally administered, was found on dissection to have produced little or no derangement of the viscera of the thorax and abdomen, or of the larger vessels, while "the brain and dura mater showed marks of a most violent and excessive inflammation." As the virulence of the Tshettik is now known, by the analysis of MM. Pelletier and Caventou*, to depend upon the presence of strychnine, this difference in the *modus operandi* of the two poisons is satisfactorily accounted for by the specific action on the brain and nerves which is so strongly characteristic of that most powerfully tetanic of all vegetable substances.

Although well aware of this difference in the action of the two poisons, M. Orfila†, who had repeated the experiments of MM. Magendie and Delile, states it as his opinion, in 1815, that the Antiar acts, through the medium of the circulation, on the brain and spinal cord.

This long historical detail may be closed by the chemical analysis made of the poison of the Antiar by MM. Pelletier and Caventou‡ in 1824, the results of which are thus stated. The Upas contains a peculiar elastic

* *Annales de Chimie et de Physique*, tom. xxvi. p. 44, *et suiv.*

† *Traité des Poisons*, tom. ii. par. 2, p. 3.

‡ *Annales de Chimie et de Physique*, tom. xxvi. p. 59, *et suiv.*

resin; an almost insoluble gummy substance; and a bitter substance soluble in alcohol and in water. This bitter substance, in which the poisonous qualities of the Antiar reside, is composed of a colouring matter capable of being absorbed by animal charcoal; of an undetermined acid; and of the true active principle of the Antiar, which has the appearance of a soluble vegetable alkali. In addition to the chemical analysis, there are also given a few physiological experiments which prove, in the opinion of the authors, that the symptoms produced by the poison are the effect of a double action on the nervous system and on the stomach, the convulsions to which it gives rise differing from those which result from the Tieuté in their clonic character, being accompanied by intervals of relaxation; while those produced by the latter are tonic, or, in other words, give rise to tetanus properly so called. It is manifest, however, from all the dissections, that the brain is far less affected than the organs of the circulation in animals poisoned by the Antiar.

The general results at which Mr. Brodie had arrived with respect to the operation of poisons have been still more recently impugned by Dr. Addison and Mr. Morgan*; but as their experiments were made with the woorara poison of Demerara, which has been ascertained by Dr. Schomburgk to be the produce of a species of *Strychnos*, they have no direct bearing on the subject of the Upas Antshar.

The place of *Antiaris* in the natural system is indicated by Mr. Brown† as standing "between *Brosimum* of Swartz, and *Olmedia* of 'Flora Peruviana,' agreeing with the latter in the structure of its male flowers, and more nearly resembling the former in its female flowers and fruit." But although its immediate affinities are thus distinctly marked, it still remains to determine and to limit the particular family in the great class of *Urticeæ*, to which, in the necessary subdivision of that extensive tribe of plants, it should ultimately be referred. After the separation of *Artocarpeæ*, and the restriction of *Urticeæ*, properly so called, to the immediate affinities of the genus *Urtica*‡, there remains a large and heterogeneous group, to which, until a more satisfactory analysis has been made, the name of *Moreæ*, used by Prof. von Martius §, may be applied. In this group *Antiaris* may be provisionally comprehended: it differs, however, too remarkably, in several essential particulars, from *Morus* and its near allies, to allow of its long continuing to occupy a place in the family to which that genus gives a name. Some suggestions on this subject by M. Gaudichaud are contained in a note on his section of *Broussonetieæ*, in the Botanical part of M. Freycinet's Voyage‖; but he does not appear to have seen specimens of *Antiaris*, and his ideas concerning it are consequently by no means fixed. The same observation may also be applied to those¶ who have referred it to *Artocarpeæ*, in common with various other genera equally distinct from that family.

In his edition of the "Systema Vegetabilium," Sprengel has removed the genus *Antiaris*, together with *Morus*, to Tetrandria Digynia**, but on what ground does not appear, his generic character properly describing the flowers as monœcious. The involucrum and calyx are described without distinction of male or female, and the involucrum is said to be "sub- 6-florum," which applies to neither sex, while the "cal. 4-sepalus" belongs only to the male. His specific characters†† are equally incorrect: the form and surface of the leaves (judging of the New Holland species from Mr. Brown's‡‡ description and Ferdinand Bauer's drawing§§) afford no clearly distinctive marks; and the peduncles of the Javanese species, instead of being solitary, are at the least as numerous as those of the New Holland plant. They are, however, of much greater length. In their native countries the difference between the two species would be at once obvious in the size to which they attain, *A. toxicaria* being

* Essay on the Operation of Poisonous Agents upon the Living Body. Lond. 1829.

† Appendix to Captain Flinders's Narrative, &c., ii. p. 603.

‡ Appendix to Captain Tuckey's Narrative, &c., p. 454.

§ *Conspectus*, No.

‖ p. 508.

¶ *Bartling, Ordines Naturales*, p. 105.

** vol. i. p. 374.

†† *Ibid.* p. 492.

‡‡ Appendix to Captain Flinders's Narrative, ii. p. 602.

§§ *Ibid.*, Atlas, t. 5.

described as a tree of from 80 to 100 feet in height, while *A. macrophylla* is merely a "frutex orgyalis;" and in the herbarium the size, form, and direction of the segments of the male involucre will afford a readily appreciable distinction. To this character I should have been inclined to add, from the examination of Dr. Horsfield's specimens, the separation of the sexes in the Javanese plant in distinct axillæ, had not a separate figure, in one of M. Deschamps' drawings, exhibited a single female forming part of the same fasciculus with the male capitula. The characters of the involucra are, however, amply sufficient for the purpose, and may be expressed in the following terms:

A. toxicaria, involucri masculi laciniis ovatis perianthiorum longitudine reflexis.

A. macrophylla, involucri masculi laciniis lanceolatis perianthiis pluriès longioribus inflexis.

Antiaris macrophylla, *R. Br. in Flind. Voy.*, ii. *p.* 602. *t.* 5.

It is proper to observe that the preceding article was entirely written long before the appearance of Dr. Blume's valuable dissertation on the subject of the Upas*, to which the reader is referred for various additional particulars concerning it.

I. J. B.

Tab. XIII. *Fig.* 1. A branch of *Antiaris toxicaria*, of the natural size. *Fig.* 2. A male flower, magnified. *Fig.* 3. A longitudinal section of the ovarium, showing the pendulous ovulum, magnified. *Fig.* 4. The ripe fruit, of the natural size. *Fig.* 5. The seed, inclosed in its putamen. *Fig.* 6. The embryo.

* *Rumphia*, p. 46, *et seqq.*

POUZOLZIA PENTANDRA.

TAB. XIV.

POUZOLZIA, *Gaud. in Voy. de l'Uranie, Bot.* p. 503.

CHAR. GEN. *Flores* monoici vel dioici. Masc. *Perianthium* 4- vel 5-partitum. *Stamina* 4 vel 5. *Rudimentum pistilli* abortivi minimum. Fem. *Perianthium* fructiferum auctum sulcato-costatum vel bialatum, nucem ovatam arctè fovens, limbo brevissimè 2-dentato. *Stylus* nullus. *Stigma* filiforme, unilateraliter glandulosum.

Herbæ *perennes, prostratæ, diffusæ, vel suberectæ.* Folia *opposita vel alterna, trinervia, integerrima.* Flores *in axillis glomerati, subsessiles.*

* Fructus *bialatus.* Folia (*saltem inferiora*) *opposita.*—MEMORIALIS, Ham.

POUZOLZIA *pentandra*, monoica, pentandra, caule infernè ramosissimo tetragono lævigato, foliis inferioribus subsessilibus angusto-lanceolatis cordatis lævigatis, glomerulis laxifloris.

Urtica pentandra. *Roxb.! Fl. Ind.* iii. p. 583. *Wall.! List, No.* 4598. (excl. specim. quibusdam ex H. B. C.)
Memorialis ciliaris. *Ham.! in Wall. List, No.* 4598.
Hab. in Javâ, *Horsfield*; Bengal, *Kœnig, Roxburgh*; Napaliâ, *Hamilton, Wallich.*

DESCR. Herba perennis, bipedalis, ascendens, infernè simpliciter ramosa, supernè simplex elongata. Caulis ramique cruciatim oppositi sulcati, tetragoni, angulis pilosiusculis. Folia inferiora (ramos subtendentia) opposita, elóngato-lanceolata, 3-pollicaria, basi cordata, integerrima, trinervia, supernè punctis numerosis albidis scabra, infernè glabra ad nervos hinc inde rariùs pilosula, margine aculeis inconspicuis, antrorsùm versis, appressis, ciliolata, patula; superiora caulis (fasciculos florum subtendentia) alterna, in omnibus similia, nisi quòd minora (pollicaria tantùm), basi minùs cordata, pro longitudine aliquantò latiora, magisque deflexa; ramea denique etiam alterna, adhuc minora (4—8-lineas longa), ovata, vix cordata, mucronulata. Petioli brevissimi, hispidiusculi. Fasciculi florum intra folia omnia axillares, e floribus 3 vel 4 femineis sessilibus, totidemque mas-

Tab. XIV.



POUZOLZIA PENTANDRA.

culis breviter pedicellatis, compositi. Bracteæ minimæ, ovatæ, vix involucrantes. Flores masculi: perianthium 5-phyllum, foliolis æqualibus, in æstivatione valvatim cohærentibus, demùm ad basin usque solutis, nervo medio vix prominulo donatis, ultra medium geniculatim inflexis, ibique in flexurâ processu externo membranaceo ciliato, flore inaperto annulari, auctis. Stamina 5, perianthii foliolis opposita, filamentis planis, in æstivatione inflexis, antheras tunc resupinatas medio dorso affixas gerentibus, post florescentiam elasticè resilientibus, antherasque subrotundas, biloculares, polline minuto subsphærico vel ovali lævi refertas exserentibus. Rudimentum pistilli ovato-conicum, brevissimum, abortivum. Flores fœminei: perianthium monophyllum, urceolatum, limbo brevissimè 2-dentato; fructiferum auctum, incrassatum, bialatum; alis latis, membranaceis, margine integerrimis, reticulatim venosis. Staminum rudimenta nulla. Ovarium liberum, ovatum; ovulo solitario, erecto, membranis circa foramen majusculum paulùm ampliatis, ad apicem ovarii appositis, ibique insertionem superiorem mentientibus. Stylus nullus. Stigma simplex, filiforme, unilateraliter pilosum. Nux tubo perianthii bialati persistente arctè tecta, ovata, acuminata, crustacea, fragilis, nigra, lucida. Semen unicum, basi affixum, erectum. Albumen parcum. Embryo inversus; radiculâ subcylindricâ longiusculâ apicem seminis spectante; cotyledonibus planiusculis subrotundis.

In the botanical part of Freycinet's Voyage round the World, M. Gaudichaud* has given a sketch of a new arrangement of the extensive family of *Urticeæ*, in which the Linnean genus *Parietaria* is subdivided into seven distinct groups, founded chiefly on the modifications of the fructiferous calyx. Among these groups, that to which he has applied the name of *Pouzolzia* is particularly well marked by the distinct habit of most of the species composing it, and by their geographical distribution, as well as by the peculiar characters of their fructification. These characters consist in the female perianthium enlarging in size and changing in form as the fruit advances towards maturity, and finally constituting, at the completion of that period, an undivided envelope closely applied to the surface of the fruit, and furnished with a series of projecting ribs (most commonly double in number to that of the parts forming the male perianthium), with the frequent development (sometimes additional and sometimes at the expense of the ribs) of two broad wing-like expansions, bearing a strong external resemblance to the wings of the seed-vessel of *Oxyria*. The presence or absence of these wings in the different species appears to afford so obvious a character in the ripe state of the fruit, that I should have been tempted to carry still further the subdivision of the Linnean group, and to regard the *Pouzolzia* of M. Gaudichaud as resolvable into two genera, were it not that in the earlier stage there exist no sufficient means of distinction; and that even in the ripe state, and in those species which are most obviously furnished with wings, those organs appear occasionally to remain undeveloped in some few of the flowers, although the great majority continue to produce them. It will therefore, perhaps, be more advisable to regard this distinction as only of sectional importance.

The plant now figured, specimens of which, collected in Bengal, were sent to Sir Joseph Banks by Dr. Kœnig, was described by the latter more than fifty years since in his MSS. as forming a new genus; and Dr. Hamilton also appears, from the MS. name of *Memorialis* applied to the three species, all of the winged group, contained in his Herbarium, to have regarded it in the same light. This name, although not very well constructed, I have adopted for the section; and should it be deemed advisable at any future period to separate the species comprehended under it, this will of course become their generic name, that of *Pouzolzia* being thenceforth restricted to the section with sulcated and wingless fruits. The following synopsis of the species of the former section at present

* *Voyage autour du Monde executé sur les Corvettes l'Uranie, &c.* Botanique, p. 503.

known to me is derived from the materials contained in the Banksian Herbarium, in the Indian Herbarium of the Linnean Society, and in Dr. Horsfield's Javanese collection. I have added indications of the sulcated species contained in the same Herbaria, with some notes on their synonomy; and have no doubt that a very considerable number of plants will ultimately be found to arrange themselves under the same head.

POUZOLZIA.

* Fructus *bialatus*. Folia (*saltèm inferiora*) *opposita*.—MEMORIALIS, Ham.

1. *P. pentandra* (vide suprà).

2. *P. caudata*, monoica, tetrandra, caule parùm ramoso tereti glabro, foliis inferioribus subsessilibus ovato-lanceolatis cordatis utrinque glabris: superioribus minimis bracteæformibus, glomerulis paucifloris.

Urtica caudata, *Hb. Madr.! in Wall. List*, No. 4600 A, B. (pro parte).

Hab. in montosis regni Travancore et Courtallum, *Hb. Madr.* (*exam. s. in Herb. Ind. Soc. Linn.*)

3. *P. Wightii*, monoica, tetrandra, caule vix ramoso tereti tomentoso, foliis inferioribus brevi-petiolatis basi acutis lineari-lanceolatis suprà asperis infrà molliter tomentosis, glomerulis densifloris.

Urtica ternata? *Wall.! List*, No. 4599 C. *ex Hb. Wight.*

Hab. in ditione Madraspatanâ? (*exam. s. in Herb. Ind. Soc. Linn.*)

4. *P. ternata*, monoica, tetrandra, caule vix ramoso tereti tomentoso, foliis omnibus similibus oppositis vel ternatis subsessilibus lanceolatis subcordatis suprà pilosis infrà molliter tomentosis, glomerulis densifloris, floribus femineis paucis.

Urtica ternata, *Heyne! in Wall. List*, No. 4599 A, B.

Hab. in Courtallum et montibus Travancore, *Heyne.* (*exam. s. in Herb. Ind. Soc. Linn.*)

5. *P. hispida*, dioica, pentandra, caule angulato pubescente, foliis subsessilibus lanceolatis cordatis suprà asperis infrà glabratis, glomerulis densifloris.

Memorialis hispida, *Ham.! in Wall. List*, No. 4601 A. (pro parte).

β. caule ramoso, foliis rameis ovatis.

Urtica quinquenervis, *Wall.! List*, No. 4601 B.

γ. foliis vix tactu asperis, plantâ femineâ in omni parte magis glabratâ.

Urtica quinquenervis, *Wall.! List*, No. 4601 C.

Hab. α. et β. in Napaliâ, *Hamilton, Wallich*; γ. in Sylhet, *Wallich* (*exam. s. in Herbb. Banks. et Soc. Linn.*).

6. *P. quinquenervis*, dioica, pentandra, caule vix ramoso angulato lævigato, foliis omnibus similibus brevi-petiolatis ovato-lanceolatis subacuminatis basi quinquenervibus utrinque glabratis, glomerulis masculis densifloris.

Memorialis quinquenervis, *Ham.! in Wall. List*, No. 4601 A. (pro parte).

Hab. in Napaliâ, *Hamilton* (*exam. s. in Herb. Ind. Soc. Linn.*).

Obs. Flores feminei non visi; hùc tamen cum sequente, ex affinitate manifestâ cum præcedente, relata.

7. *P. cordata*, dioica, pentandra, caule vix ramoso angulato lævigato, foliis omnibus similibus subsessilibus cordatis acuminatis basi quinquenervibus suprà asperis infrà in venis pilosiusculis, glomerulis masculis densifloris.

Hab. in Javâ, *Horsfield* (*exam. s. in Herb. Horsf.*).

8. *P. prostrata*, dioica, tetrandra, diffusa, caule angulato pilosiusculo, foliis omnibus subsimilibus petiolatis lato-ovatis obtusiusculis suprà pilosiusculis subtùs in venis pubescentibus, glomerulis masculis paucifloris.

Hab. in Javâ, *Horsfield* (*exam. s. in Herb. Horsf.*).

Obs. Ad sectionem sequentem (feminâ cognitâ) fortè referenda.

9. *P. Zeylanica*, monoica, tetrandra, caule vix ramoso angulato piloso, foliis omnibus similibus longè petiolatis ovatis pilosulis, glomerulis paucifloris.

Parietaria, *L.! Fl. Zeyl.*, No. 371, et ideò

Parietaria Zeylanica, *L. Sp. Pl. ed.* 1 *et* 2.; nec *Mant.* p. 501—2, quæ ex descriptione et specimine ipso ad sectionem sequentem referenda.

Hab. in insulâ Ceylon, *Hermann* (*exam. s. in Herb. Herm.*).

** Fructus *sulcatus nec alatus*. Folia *plerùmque omnia alterna*.

To this second section belong the *Parietaria Zeylanica L. Mant.* p. 501—2., excluded above (*Urtica alienata*, Syst. Veg. ed. 13. p. 709), having, as Linnæus justly describes it, "fructus ovatus torulosus sulcis 8 longitudinalibus," which approaches very nearly to the *Urtica triplinervis*, Hb. Madr. of Dr. Wallich's List, No. 4607; and the *Parietaria Indica*, L. Mant. p. 128, the original specimen of which in the Linnean Herbarium agrees tolerably well with the plant so named by Dr. Wight, and enumerated by Dr. Wallich under his No. 4619, where it is mixed up with another species of the same section. Nearly related to these is a Javanese plant in Dr. Horsfield's collection, which may be characterized in the following terms:

P. pauciflora, monoica, tetrandra, caule vix ramoso angulato lævigato, foliis omnibus similibus longiùs petiolatis ovato-lanceolatis basi acutis glabris, glomerulis paucifloris.

The same section will also comprehend the species from the Calcutta Botanic Garden above alluded to as mixed up with Dr. Wallich's specimens of *P. pentandra* from the same place; and the *Parietaria bracteata* of Dr. Wight's Herbarium from Dindygul, appended in Dr. Wallich's List, No. 4600, with a mark of doubt, to *P. caudata*; as well as the species from Timor, described by M. De Caisne* under the name of *Pouzolzia parietarioides*, which appears from the description to differ from *P. pauciflora* above described, in having "folia obtusa, basi rotundata, suprà scabriuscula, subtùs subpilosa, breviter petiolata," and in some other particulars.

Of the two species referred to by M. Gaudichaud† as the genuine species of *Pouzolzia* known to him, *Parietaria lævigata*, Poir., and *P. canescens*, Poir., I can give no account. The description of the former, given in the Encyclopédie Méthodique‡, and the specific characters framed by M. De Caisne§ for a plant of Timor, regarded

* *Nouvelles Annales du Muséum*, tom. iii. p. 492. † l. c. p. 503. ‡ tom. v. p. 15. § l. c.

by him as the same, leave in doubt even the section to which it belongs; while, as regards the latter, I know not even where it is described. The doubtful species mentioned by M. Gaudichaud, are: 1. the "*Urtica alienata*, L. (H. Juss.)," the Linnean specimen of which, as we have before seen, undoubtedly belongs to the second section; 2. the "*Parietaria Indica?* (Id.)," of which the same may be said; 3. the "*P. Sonnerati*, Poir.," the description of which* is not sufficiently precise to enable us to determine its proper position, but renders it probable that it does not belong to the present genus; 4. the "*U. ulmifolia*, Vahl," which is totally unknown to me even by description†; 5. the "*P. verbascifolia*, Poir.," which may, from the character given‡, be a *Pouzolzia*, but is not sufficiently described to enable us to affirm the fact; and again, 6, the "*P. Indica*, L. (*Achyranthes aspera*, Rumph. Amb. 10. t. 12. f. 2.)"

This last reference I do not clearly understand; but it is probable that M. Gaudichaud meant to state that, assuming the *Parietaria Indica*, L. to be founded on the figure here quoted, it would be synonymous with *Achyranthes aspera*, L., which that figure is supposed to represent. But the references to Rumphius for the plant in question have been throughout erroneous. Linnæus, who founded the species on specimens of a true *Pouzolzia*, referred to it the *Cratæogonum* of Rumphius, t. 10. f. 1., without quoting volume or book§. If this reference were meant, as the name goes far towards proving, for tom. vi. t. 10., he had himself previously, and with greater appearance of justice, cited that figure for his *Oldenlandia verticillata*‖. Aware of this fact, and probably taking it for granted that Linnæus had no specimen of the *P. Indica*, M. Poiret¶ excluded that plant from the genus, and affirmed its identity with the *Oldenlandia verticillata*. In the passage quoted M. Gaudichaud appears to refer the *P. Indica*, L. to Rumph. Amb. 10. t. 12. f. 2., and cites that figure as belonging to *Achyranthes aspera*, L.; whereas the latter plant is in fact represented at f. 1. of the same plate, and f. 2. bears a sufficiently obvious resemblance to the true *P. Indica*, with which it is probably nearly related. It does not, however, by any means correspond with the description of the *Herba Memoriæ***, to which it is referred in the explanation of the plate, and from which it is not improbable that the idea of Dr. Hamilton's generic name of *Memorialis* was derived.

In the character of his tribe of *Parietarieæ*††, M. Gaudichaud describes the ovulum as "erectum apiceque vasis filiformibus suspensum;" in that of his *Urereæ*‡‡, he terms it "erectum vasisque filiformibus e vertice ortis cum stigmate continuum;" and words of similar import are used in describing the ovula of his *Elatostemeæ*, *Bœhmerieæ*, and *Forskalieæ*. From these expressions it may be inferred that he adopts the opinion of M. Turpin§§, that the micropyle of seeds in general is the cicatrix of a vascular cord through which the fecundation of the ovulum takes place, together with the illustrations of this theory furnished by M. Auguste St. Hilaire‖‖, and which are partly taken from the present family, but chiefly from those of *Polygoneæ* and *Chenopodeæ*, and from certain genera more or less intimately related to the latter. But this opinion has been so completely refuted by Mr. Brown ¶¶, who has shown the supposed organic connexion to be merely a simple contact between the parts, sometimes indeed, as in *Plumbagineæ*, effected in a very remarkable manner; and the refutation thus given has since received such ample illustration from M. Adolphe Brongniart*** and from M. Mirbel†††, that it is needless to enter into any detail regarding it. I will only, therefore, observe, that in the genus *Pouzolzia*, as in all the other genuine *Urticeæ* which I have examined, and in *Artocarpeæ*, the supposed superior point of attachment of the ovulum has always proved, on a close examination, to be merely a membranous and somewhat

* *Enc. Méth.* v. p. 15.

† There is an *Urtica ulmifolia*, Kunth, which has no affinity to *Pouzolzia*.

‡ *Enc. Méth.* v. p. 16.

§ *Mantissa*, p. 128.

‖ *Ibid.* p. 40.

¶ *Enc. Méth.* v. p. 17.

** *Rumph. Amb.* vi. p. 29.

†† l. c. p. 501.

‡‡ Ibid. p. 496.

§§ *Annales du Muséum*, vii. p. 199.

‖‖ *Mémoires du Muséum*, tom. ii. p. 269, &c.

¶¶ Appendix to Capt. King's Narrative of a Survey of the North and West Coasts of Australia, 2. p. 546, &c.

*** *Annales des Sciences Naturelles*, tom. xii. p. 229 & note.

††† *Ibid.* tom. xvii. p. 312. t. 13, & t. 15.

tubular elongation of the margin of the testa surrounding the aperture, which is thus placed in close and immediate contact with the base of the style. I have never been able to perceive the slightest trace of the existence of a vascular connexion; nor (although it is by no means improbable that such a development may take place at some definite period during the progress of the ovulum) have I yet observed the production, from the inner surface of the ovarium, of a plug similar to that which occurs in *Statice*, and stops up an elongation of the margin of the aperture in some respects resembling that of the *Urticeæ* in question.

By some strange oversight, Professor Lindley* describes the entire family of *Urticeæ* (including *Artocarpeæ*, *Moreæ*, and the anomalous genera) as having the "radicle always pointing to the hilum;" whereas, in the great majority of the genera enumerated by him, comprehending the whole of his first six sections, and a part of the remainder, the reverse is certainly the case, the ovulum being (as described by Mr. Brown†) "erect, while the embryo is inverted or pendulous." This fact is so well known, at least as regards the more common forms of *Urticeæ*, that Professor Lindley's statement could only have been regarded as an accidental slip of the pen, had he not used it as an unfailing mark of distinction between *Urticeæ* and *Polygoneæ*, which latter have (as Mr. Brown has observed) "the same characters, of erect ovulum and inverted embryo," that belong to *Urticeæ* properly so called.

The resemblance noticed in the commencement of the present article between the fruit of the species of *Pouzolzia* of the first section, when inclosed within its winged calyx, and the winged seed-vessel of *Oxyria*, is of course merely formal, although probably conducive to the same functional end in the dispersion of the seeds. But the tendency of the persistent calyx, so variously modified in *Urticeæ* generally, to become in this genus enlarged and thickened during the progress of the included fruit towards maturity, cannot fail to suggest an analogical, if not a nearer, relation to the genus *Rumex* and other *Polygoneæ*, in which a similar process takes place. It seems now to be generally acknowledged, that an intimate connexion, manifested especially in the structure of their fruits and seeds, exists between *Polygoneæ* and *Urticeæ*; and if this be allowed, I know not where to find a nearer approach among the latter than is afforded by the present genus, the habit of which, as indeed that of most *Parietarieæ*, seems in some measure to confirm the approximation. This enlargement and alteration in the form of the fructiferous calyx extend, however, much more widely among the single-seeded *Apetalæ*, and become especially conspicuous among the *Chenopodeæ*, where, as in the subdivisions of *Parietaria*, they form the best and most readily appreciable characters for the distinction of genera. Here again we find an evident relation with a group also (but less intimately) connected in the structure of its fruit and seed, although, generally speaking, of a different habit. In relation to the latter point, however, it may not be altogether without interest to observe that the *Parietaria polygonoides* of Willdenow, which expresses in its name the first-mentioned analogy, is in truth related neither to *Parietaria* nor to *Polygonum*, but (according to an authentic specimen from Tournefort in the Banksian Herbarium) constitutes one of those numerous Chenopodeous forms, so abundant in the East, and which still, notwithstanding all that has been done for their elucidation by modern writers, require a complete and searching revision.

Dr. Horsfield states that *Pouzolzia pentandra* is the "*Salanjowo*, *Urangurungan* or *Sambangchollok* of the Javanese. It is found in all parts of the island, near rivulets, at a very slight elevation (about 200 feet) above the level of the ocean." I. J. B.

TAB. XIV. *Fig.* 1. *Pouzolzia pentandra*, of the natural size. *Fig.* 2. A male flower, magnified, seen from below. *Fig.* 3. The same, with the perianthium expanded seen from within. *Fig.* 4. The ripe fruit, inclosed in its 2-winged perianthium. *Fig.* 5. The fruit, removed from its perianthium. *Fig.* 6. The embryo.

* Natural System of Botany, ed. 2. p. 175.

† Tuckey's Narrative, App. p. 454.

GUNNERA MACROPHYLLA, *Bl.*

TAB. XV.

GUNNERA, *L.*

CHAR. GEN. *Flores* hermaphroditi, v. monoici. *Calyx* ovario adhærens, bidentatus. *Petala* 2 (in floribus masculis et hermaphroditis tantùm observata), cum dentibus calycis alternantia, citò caduca. *Stamina* 2, petalis opposita. *Ovarium* 1-spermum; ovulo ex apice loculi pendulo. *Stigmata* 2, sessilia. *Drupæ* carnosæ, baccatim congestæ. *Semen* albuminosum.

Herbæ *acaules*; foliis *petiolatis, cordatis, digitato-nervosis*. Scapus *polystachyus*. Spicæ *floribus parvis sessilibus densè vestitæ*; in monoicis *inferiores femineæ, superiores masculæ*. Pollen *e granulis* 4 *tetrahedrè coacervatis compositum*.

GUNNERA *macrophylla*, monoica, foliis scapum æquantibus pilosis subrotundis obsoletè vix angulato-lobatis minutè eroso-crenatis: lobis posticis incumbentibus, scapi ramis etiam fructiferis approximatis.

Gunnera macrophylla. *Blume Bijdr.* p. 513.

DESCR. Herba bipedalis, acaulis. Radix repens, sublignosa, folia et scapum exserens. Folia unà cum inflorescentiâ evoluta, subrotunda, ad medium usque cordata, lobis posticis incumbentibus pseudo-peltata, demùm 6—8 pollices longa et lata, obsoletissimè angulato-lobata, subinæqualiter minutè eroso-crenata, in omni superficie sed præcipuè in nervis venisque pilis brevibus appressis vestita, minimè scabra; nervis primariis 5 vel 7, crassis, dichotomè ramosis, ad marginem usque excurrentibus, in utrâque paginâ prominulis. Petiolus pedalis, extùs rotundatus, intùs latè et profundè sulcatus, sericeo-pubescens, infernè demùm plùs minùs lævigatus. Flores monoici, in spicis numerosissimis secùs scapum folia superantem densè congesti. Scapus floriferus 6-pollicaris, fructiferus bipedalis, dimidio inferiore femineus, superiore masculus. Rachis universalis partialesque subcylindricæ, densè sericeo-pubescentes. Spicæ omnes simplices, flores confertos sessiles a basi ad apicem gerentes, ineunte florescentiâ 2—6 lineas longæ, fructiferæ demùm bipollicares; singulæ bracteâ subtendente ovato- vel oblongo-lanceolatâ, ciliatâ, demùm semipollicari, instructæ. Flores minimi, glabri. Spicæ inferiores femineæ. Calyx ovario adhæ-



rens, bidentatus; dentibus medio articulatis, basi breviter ovatâ persistente, apice subulato marcescente caduco. Ovarium subrotundum, stigmatibus duobus sessilibus lanceolatis, demùm elongatis reflexis, cum dentibus calycinis alternantibus, coronatum. Ovulum unicum, ex apice cavitatis ovarii pendulum, obovatum. Fructus drupaceus, virescens, lævis, magnitudine seminis sinapeos, dentium calycinorum basibus persistentibus coronatus; mesocarpio succulento; putamine tenui, cartilagineo, fragili. Semen pendulum, funiculo brevissimo affixum, subsphæricum; membranis tenuissimis; albumine copioso, oleo scatente, tenuiter carnoso. Embryo (in exemplaribus haud penitùs maturis) non visus. Flores masculi in spicis superioribus, post florescentiam minùs densè congesti. Dentes calycini ad apicem ovarii abortivi iis floris feminei simillimi. Petala 2, cum dentibus calycis alternantia iisque triplò longiora, pauld altiùs inserta, spathulata, ciliis longis marginata, super antheras cucullatim inflexa, citò caduca. Stamina 2, petalis opposita; filamentis rectis, dùm petala adsint brevissimis, dein elongatis filiformibus; antheris brevitèr ovalibus, bilocularibus, rimâ marginali longitudinaliter dehiscentibus; polline parvo, lævi, e granulis quaternis tetrahedrè coacervatis. Stigmatum rudimenta nulla. In medio scapo spicæ plures flores femineos ad apicem, masculos basin versùs, gerunt; inter hos flores aliquot hermaphroditi evadunt, sed an fertiles nescio. In his, sicut et in masculis, petala cum dentibus calycis alternant, et stamina (ad apicem germinis inserta) petalis opponuntur; stigmata etiam petalis et staminibus sunt opposita, partes omnes formâ situque cum partibus analogis floris masculi et feminei congruentes.

The earliest known species of *Gunnera* was introduced into the Leyden Garden from the Cape of Good Hope towards the end of the seventeenth century, and soon found its way into other botanic gardens both in England and on the Continent. It does not appear to have at that time produced flowers in Europe; and Hermann*, who had only seen its leaves, compared them with those of *Petasites* or of *Caltha*. Ray† and Morison‡ afterwards described the seeds as similar to those of *Blitum*; and Plukenet§, who gave a figure of the plant, actually referred it to that genus. In the first edition of the "Hortus Kewensis" it is said to have been introduced into England in 1767 by Mr. William Malcolm; but Ray's authority is quoted in the second edition of that work for its having been cultivated by Mr. Samuel Doody prior to 1688. The passage in the "Historia Plantarum" does not, however, state that it was a living plant which Ray had seen in Doody's possession; and this is scarcely probable, inasmuch as the specimen to which he refers was in fruit. The proof that it was then, or not long subsequently, cultivated in England, is rather to be found in a specimen, consisting of leaves only, preserved in Petiver's "Botanicum Hortense ineditum, in which are contained many plants nursed *in English gardens* from several parts of the world," forming part of the Sloanean Herbarium in the British Museum. Petiver also possessed a specimen in fruit gathered at the Cape by Oldenburg; and among Plukenet's collections in the same Herbarium are two specimens, one with and the other without fruit, the former of which served as the type of his figure above referred to.

In 1767 Linnæus first published this plant as a distinct genus under the name of *Gunnera*‖. He regarded it as hermaphrodite, and described it as having "perianthium nullum nisi crusta seminis bidentata;" "filamenta duo, brevissima, opposita, insidentia germinis lateribus extra dentes;" and "styli duo, breves, subulati, inter dentes germinis." I know not how Linnæus could have been led to believe in the attachment of the stamina in the strange position here assigned to them, in which they are also distinctly figured in a rude sketch given in a more

* *Hort. Lugd. Bat.*, p. 488.
† *Hist. Plant. App.* p. 1858.
‡ *Hist. Oxon.* s. 7. p. 95. n. 5.
§ *Almag.* p. 68; *Phytogr.* t. 18. f. 2.
‖ *Mantissa Plantarum*, p. 16 & 121.

lengthened notice of the plant appended to his dissertation, intitled, "Rariora Norwegiæ," published in 1768*. On account, however, of this supposed anomaly, he states that *Gunnera* "ab omnibus reliquis generibus cognitis ita distinctum evadit, ut aliàs quodpiam etiamnum notum genus;" and even doubts to which of his own classes it should be referred. "Classem quoque hujus plantæ," he says, "constituere valdè difficile est, quum stamina ad latera germinis sedeant, ut, an flos sit superus an inferus vere non dixeris; nihilominus tamen ad classem *Gynandriæ Diandriæ* retulit Nob. Dn. Præses." The structure thus strangely misunderstood is in every essential particular the same with that of *Gunnera macrophylla*, both being monoicous, with the female flowers on the lower, and the male on the upper branches of the compound spike; and Burmann, who described the Cape plant in the same year under the name of *Perpensum blitispermum*†, inserted it without hesitation in the class *Monœcia*.

Jussieu‡ adopted the Linnean character of the genus, but referred to Burmann for its monoicous structure; and this led him to suspect that it was not really distinct from the *Misandra* of Commerson's MSS., a dioicous plant from the Straits of Magellan, the generic characters of which he then for the first time published. He also added as a species of *Gunnera*, on the authority of Dombey, the *Panke* of Feuillée §, of which a figure and description had been given, seventy-five years previously, by the last-named author, but which had remained till then unnoticed by systematic writers.

In the same year, Lamarck ||, having examined specimens of the Cape, Chilian, and Magellanic plants in the Herbarium of Jussieu, arrived at the conclusion that they were all dioicous; that Linnæus had been deceived in what he had taken for stamina in *Gunnera perpensa*; and that of this species, as well as of the *Panke* of Feuillée, the female only had been observed. On this presumption (which is the more extraordinary, inasmuch as the *Panke* is unquestionably hermaphrodite), he adopted the suggestion of Jussieu, and combined *Gunnera* and *Misandra*, subjoining to the Linnean character of the former an amended one in conformity with his views; and as a necessary consequence of his belief that the sexes were found in all the species in distinct plants, he removed the genus to *Diœcia Diandria*. His plate ¶ contains a copy of Feuillée's figure of the *Panke* (to which he gives the name of *Gunn. Chilensis*), and figures of the male and female plants (the latter both in flower and fruit) of Commerson's *Misandra*, which he names *Gunn. Magellanica*.

The *Panke* of Feuillée was again described and figured in 1798 by Ruiz and Pavon**, who determined it to be hermaphrodite, and removed the genus *Gunnera* from *Gynandria* to *Diandria* "ob staminum situm in receptaculo." They describe the stamina as being "inter perianthium et germen receptaculo inserta, denticulis [calycis] alternantia," at the same time ascribing to the plant the incompatible character of "germen inferum." In their figure the stamina are represented as distinctly epigynous, and have the appearance of being inserted opposite to the teeth of the calyx, and alternately with the styles. Having found the plant in Peru as well as Chili, they substitute the specific name of *scabra* in place of *Chilensis*.

In 1804, Vahl†† adopted Ruiz and Pavon's classification of the genus *Gunnera*, together with their name and description of the Chilian species; and followed Lamarck in referring the Magellanic plant, with the altered specific name of *plicata*, to the same genus. Willdenow‡‡ in the succeeding year adopted Vahl's nomenclature, and Lamarck's definition of the species; but returned to the Linnean classification in *Gynandria*, perhaps for no better reason than that he had previously omitted the genus in the class *Diandria*.

In 1817 M. Kunth §§ described *Gunnera scabra* from the collection of MM. Humboldt and Bonpland, and added the distinctive characters of another Peruvian plant, of which he had only seen the leaves, and which he named *Gunn. pilosa*. He suspected it, however, to be merely a variety of *Gunn. scabra*, in his description of

* *Amœn. Academ.* vii. p. 495.

† *Prodr. Fl. Capens.* p. 26.

‡ *Gen. Plant.* p. 405.

§ *Journ. des Observ. Phys. Math. et Botan.* ii. p. 741. t. 30.

|| *Encyclop. Méthod.* iii. p. 60, 61.

¶ *Illustr. des Genres*, t. 801.

** *Flora Peruviana*, i. p. 29. t. 44. f. *a*.

†† *Enumeratio Plantarum*, i. p. 308, 309.

‡‡ *Spec. Plant.* iv. p. 148, 149.

§§ *Nov. Gen. et Sp. Plant.* ii. p. 35, 36.

which he appears to have adopted, with little modification, Ruiz and Pavon's strange notion of the insertion of the stamina and position of the ovarium: "stamina duo, calyci ad basin ovarii inserta—ovarium oblongum, calyci carnoso immersum." His generic character describes the flowers as "hermaphroditi rariùs diœci," and seems therefore intended to include *Misandra* also.

In 1823, the Cape species, having flowered in a garden in the neighbourhood of London, was figured in the Botanical Magazine*. As the specimen figured was evidently monoicous, the editor suspected either that the American species did not belong to the same genus, or that *Gunnera,* like some other genera of *Urticeæ,* was subject to variations in the disposition of the sexes.

The present species was first made known by Dr. Blume† in 1825, and his generic character is far more complete and accurate than any that had been previously given. He did not, however, observe the caducous petals of the male flowers, which have hitherto been noticed only by M. Gaudichaud‡, who discovered a new species in the Island of Owhyhee, and named it, on account of these petaloid segments (as he calls them), which he at first supposed to be peculiar to it, *Gunn. petaloidea.* But having subsequently to his return to France examined other species of the genus, he was led to conclude that these segments offered a distinctive character between *Gunnera,* in the Cape and American species of which he ascertained their existence; and *Misandra,* in which he was unable to detect them.

Still more lately Bertero found on the Island of Juan Fernandez a plant which he regarded as a variety of *Gunnera scabra,* but which Dr. Steudel is disposed to consider as a distinct species, and to which he has affixed in Bertero's collection the name of *Gunn. bracteata.*

It is curious to note the variety of errors to which this unfortunate genus has given rise. Originally described as gynandrous, with the stamina seated on the sides of the germen external to the teeth of the calyx, it was subsequently regarded as dioicous; and when again considered as hermaphrodite, was described first as having the stamina inserted on the receptacle, and afterwards on the calyx. It has consequently been referred in succession to *Gynandria, Diœcia,* and *Diandria,* while its stamina have been described as epigynous, perigynous, and hypogynous. Burmann long since referred the Cape species to its true position in the class *Monœcia,* and Dr. Blume has pointed out the monoicous structure of the Javanese plant; but M. Gaudichaud, the last author who has written on the subject, and who has actually examined the former, describes the entire genus (excluding *Misandra*) as hermaphrodite.

While the classification of *Gunnera* in the Linnean system has been the subject of so much uncertainty, its position in the natural system has also been regarded with some degree of suspicion, although no one has ventured to remove it far from the place originally assigned to it by Jussieu. According to Linnæus, "non facilè cum aliquo ordine naturali comparari potest;" but Jussieu in his "Genera Plantarum§," placed it among the "genera Urticis affinia," and in an observation appended to the order, suggested the separation of *Piper* as the type of a distinct family, to which he proposed to refer *Gunnera, Misandra,* and several other genera not very intimately related together. Of the propriety of this association he subsequently‖ spoke with some degree of doubt. M. Kunth¶ has retained *Gunnera* among *Urticeæ,* with an observation indicative of his belief in its near affinity to *Piperaceæ;* and it has been placed by Dr. Blume in the same section of *Urticeæ* with the genus *Urtica* itself: while, on the other hand, Dr. Bartling** has referred it to *Artocarpeæ;* and M. Gaudichaud††, in his revision of the entire family of *Urticeæ,* forms a section under the name of *Misandreæ,* comprehending *Gunnera* and *Misandra,* which he places between *Pouroumeæ* and *Piperaceæ.*

The description of *Gunnera macrophylla* and the accompanying figure abundantly prove that the affinities of

* t. 2376.
† *Bijdragen,* p. 513.
‡ *Voyage de l'Uranie, Botanique,* p. 98.
§ p. 405, 407.
‖ *Dict. des Sci. Nat.* xli. p. 101. & lvi. p. 382.
¶ *Nov. Gen. et Spec.* ii. p. 35.
** *Ordines Naturales Plantarum,* p. 105.
†† *Voyage de l'Uranie, Botanique,* p. 512.

the genus have been altogether misunderstood, and that it bears at most but a distant relation to *Urticeæ*, from which it differs in almost every important feature, except in its solitary seed. It seems, indeed, surprising that a genus known to possess "germen inferum" should have been so long referred to an order in which, even where a partial adhesion takes place of the calyces *inter se*, as in *Artocarpus*, not the smallest tendency exists to their adhesion with the ovaria. But when to this we add the presence of distinct petals, the removal of the genus not only from the order, but also from the class to which that order is referred, is clearly indicated. Of its real affinities, and consequently of the place to be hereafter assigned to it in the system, it is not for me at present to speak. On this head Mr. Brown communicated to me in 1835 some highly curious and interesting views, into the detail of which I am precluded from entering by his absence from England while this sheet is passing through the press, and the consequent impossibility of consulting him without considerably delaying the progress of the work. I abstain, therefore, from pursuing the subject from a consciousness of my inability to do justice to his views, and in the hope that he will himself hereafter make them fully known.

It will be observed that I have not described the embryo, which I have been unable to detect in any species of the family, all the fruits which I have had an opportunity of examining being immature. It is, however, described both by Dr. Blume and M. Gaudichaud as inverted in the perisperm, (meaning, I presume, that it is placed at the opposite extremity of the seed to the hilum,) and the latter adds, that it is minute. Dr. Blume regards the putamen of the fruit as formed by the outer membrane of the seed; but I have little doubt that it is derived from the inner coat of the ovarium, the attachment of the seed within it being by means of a distinct, although very short, funiculus. In other particulars our descriptions for the most part coincide.

Dr. Blume's character of *Gunnera* seems intended, like that of Lamarck, to comprehend *Misandra* also; and I must confess that I still feel considerable doubt as to the propriety of their separation. The distinctive characters, as given by M. Gaudichaud, consist solely in the "*Flores hermaphroditi; calycis lobi duo petaloidei caduci*" of the former, opposed to the "*Flores diœci; calycis lobi duo petaloidei abortientes*" of the latter. As regards the first point of distinction, two at least of the species of *Gunnera* are monoicous; and the further stage in the separation of the sexes which removes them to distinct plants can hardly in such a case be considered as of generic importance. Whether it should be so regarded when taken in combination with the absence of the petals in the male flowers may be left undetermined, until it is positively ascertained that petals do not exist in the young male flowers of *Misandra* as well as in those of *Gunnera*. At present I am disposed to suspect that they have not been found in *Misandra* only because the flowers have been examined in too advanced a stage: those at least which I have myself observed were in the state of advancement in which the petals of *Gunnera* are no longer to be found, and in which there are no obvious traces of their previous existence. In habit there is little distinction, except the comparatively dwarf size of the species of *Misandra*, a circumstance obviously connected with the high latitude in which they grow.

The following characters may serve to distinguish the species of *Gunnera* at present known. The geographical range of the genus is exceedingly diffuse, although each species appears to be strictly limited in its place of growth, and to have sole possession of its own locality. The Cape of Good Hope, the central mountains of Java, the high land of Owhyhee, the Island of Juan Fernandez, and the western side of the Andes, from a few degrees north of the Equator to 36° south latitude, each furnish a single representative of the group; and Professor Reinwardt informs me that he has another species from the Island of Tidore. Of *Misandra*, two species (both collected by Sir Joseph Banks and Dr. Solander) inhabit the dreary mountains of Tierra del Fuego: only one of these has yet been published.

1. *G. macrophylla* (v. suprà).

2. *G. perpensa*, monoica, foliis scapo brevioribus pilosis subrotundis obsoletè lobatis crenato-dentatis: lobis posticis distantibus, scapi ramis inferioribus fructiferis remotis.

Gunnera perpensa. *Linn. Mant. Pl.* p. 16, 121. *Ejusd. Amœn. Acad.* vii. p. 494 (*cum fig. flor.*). *Bot. Mag.* t. 2376.

Perpensum blitispermum. *Burm. Prodr.* p. 26.

Blitum Africanum, &c. *Plukn. Alm.* p. 68. *Ejusd. Phytogr.* t. 18. f. 2.

Hab. ad Caput Bonæ Spei. (*exam. s.*)

3. *G. Chilensis*, hermaphrodita, foliis scapo longioribus muricato-scabris reniformi-subrotundis angulato-lobatis grossè serratis, spicis subsessilibus.

Gunnera Chilensis. *Lam. Enc. Méth.* iii. p. 61. *Ejusd. Illustr.* t. 801. f. 1. (*Icon quoad plantam integram a Feuillée mutuata*).

G. scabra. *Ruiz et Pav. Fl. Peruv.* i. p. 29. t. 44. f. a. *Kunth, Nov. Gen. Am.* ii. p. 35.

Panke Anapodophylli folio. *Feuill. Obs.* ii. p. 741. t. 30.

β. pilosa.

Gunnera pilosa. *Kunth, l. c.* p. 36, " foliis suprà densiùs papilloso-muricatis, venis venulisque subtùs petiolisque densè piloso-hispidis, lobis obtusis." *Kunth.*

Hab. in Andibus a provinciâ Caracasanâ usque ad Chili. (*exam. s.*)

4. *G. bracteata*, hermaphrodita, foliis glabris reniformibus angulato-lobatis minutè dentato-serrulatis, bracteis spicisque pedunculatis elongatis.

Gunnera scabra, var. *Bert. in Herb.*, No. 1463.

G. bracteata. *Steud. in Herb. Bert.*

Hab. secus rivulos in Insulâ Juan Fernandez. (*exam. s.*)

5. *G. petaloidea*, "foliis cordato-ovatis obsoletè lobatis suprà rugosis subtùs reticulato-venosis hispidulis." *Gaud.*

Gunnera petaloidea. *Gaud. Voy. de l'Uranie, Bot.* p. 98, 512.

Hab. in Insulâ Owhyhee.

Dr. Horsfield states that *Gunnera macrophylla* is the " *Sogmodĕlŭwi* of the Javanese. The fruit is used as a stimulant in the medical practice of the natives. I found this plant, in 1815, on a single locality only, in a deep ravine on the mountain Merbaboo (one of the peaks of the longitudinal range of volcanos), near the village of Sello, about 7000 feet above the level of the ocean. It probably grows on the same elevation in many other situations, as the fruit is pretty copiously supplied to the venders of native drugs at Semarang and Surakerta."

I. J. B.

Tab. XV. *Fig.* 1. *Gunnera macrophylla*, in fruit, of the natural size. *Fig.* 2. A young plant of the same, at the commencement of the flowering state. *Fig.* 3. A male flower, from the same specimen as *fig.* 2. *Fig.* 4. A male flower, from the same specimen as *fig.* 1, showing the changes that take place by the falling off of the tips of the teeth of the calyx and of the petals, and by the elongation of the filaments. The anthers have discharged their pollen, a grain of which is shown separate at *fig.* 5. *Fig.* 6. A female flower from the same specimen as *fig.* 2. *Fig.* 7. The same, with the ovarium laid open. *Fig.* 8. A fruit, from the same specimen as *fig.* 1.

ZIPPELIA LAPPACEA.

TAB. XVI.

ZIPPELIA, *Bl. in Sch. f. Syst.* vii. p. 1614 & 1651, *fide Endl. Gen. Pl.* p. 265-6.

CHAR. GEN. *Stamina* 6; filamentis auctis persistentibus. *Stigmata* 4. *Bacca* exsucca, aculeis glochidiatis undique muricata.

Caules *succulenti, simplices v. simpliciter furcati.* Folia *alterna, inæqualiter cordata.* Spicæ *oppositifoliæ; floribus inter se remotis.*

ZIPPELIA *lappacea.*

DESCR. Radix e fibris brevibus crassis, radiculas aliquot fibrillosas demittentibus. Caules plures, fasciculati, simplices v. infernè simpliciter furcati, sesquipedales, erecti, articulato-nodosi, paulùm geniculato-flexuosi, teretiusculi, striati, glabriusculi, succulenti; internodiis inferioribus bi-, superioribus uni-, pollicaribus. Folia alterna, pollices 3 vel 4 longa, 1—2 lata, ovato- vel oblongo-lanceolata, acuta, oblique cordata, lobo altero plerumque abbreviato, integerrima, membranacea, utrinque glabra, minutissimè glanduloso-pellucido-punctata, 3-nervia, nervis lateralibus ad apicem plerumque ductis; nervis venisque primariis suprà impressis, infrà prominentibus, reticulum laxum texentibus. Petiolus pollicaris, suprà latè sulcatus, basi dilatatâ amplexicaulis. Spicæ plures, solitariæ, simplices, oppositifoliæ, intra foliorum vaginas ortæ, longitudine foliorum, pedunculatæ, rachi scilicet infernè nudâ, supernè floribus 10—20 alternis distantibus onustâ. Flores parvi, brevissimè pedicellati, bracteis totidem parvis, lato-ovatis, cucullatis, subtensi. Perianthium nullum. Filamenta 6 brevissima, crassiuscula, ovarii basin cingentia, persistentia. Antheræ totidem oblongo-lineares, biloculares, longitudinaliter dehiscentes, basi quasi articulatæ, caducæ. Ovarium subglobosum, 1-ovulatum, apice coronatum stigmatibus 4, initio coalitis et ovarii ferè magnitudine, demùm ferè ad basin distinctis, persistentibus, apicibus reflexis. Baccæ siccæ breviter pedicellatæ, bracteis persistentibus subtensæ, magnitudine baccarum *Piperis nigri,* aculeis glochidiatis numerosissimis (ramis apicis radiantibus paucis brevibus deflexis) undique muricatæ. Semen basi affixum, subglobosum, albumine radiato farinoso albo insipido repletum. Embryonis membrana propria persistens, sacculum constituens parvum in albuminis apice, ope fili tenuis per albuminis medium ducti ad basin membranæ seminis internæ connexum. Embryo in baccis haud perfectè maturis consistentiæ minùs firmæ, ideoque obscurè tantùm visus.



ZIPPELIA LAPPACEA.

Although scarcely to be distinguished in its more essential characters from the genus *Piper*, of which it has the entire habit, the present plant could hardly with propriety be referred to that extensive group, even as at present constituted. From the plants now comprehended under that name, *Zippelia* differs in the number of its stamina, and of the divisions of its style (constantly, as far as I have observed, 6 and 4 respectively,) and in the surface and consistence of its fruit, which is a dry berry muricated throughout with glochidiated prickles. It is probable that a careful revision of the species, at present referred to the more comprehensive genus, would prove it to be separable into natural sections or genera, by means of characters derived from the number of stamina, the persistence or non-persistence of the filaments, and the form and number of the divisions of the style, in which very extensive modifications occur.

The genus *Piper* was regarded by Linnæus* as forming part of the same natural family with *Arum*, and must therefore have been presumed by him to have a monocotyledonous embryo; but was subsequently referred by M. de Jussieu† to the neighbourhood of *Urticeæ*, an association indicative of his opinion that its embryo was dicotyledonous. This view was confirmed by Gærtner‡ and by M. de Mirbel§; the latter of whom figured (together with a more minute analysis of the seed than had previously been given) a young plant of the *Piper nigrum*, for the purpose of showing that in Dicotyledonous as well as Monocotyledonous plants the roots sometimes penetrate their bark in such a manner as to become partially sheathed by it at their base. A similarly endorhizal structure has since been observed in many plants, whose position among *Dicotyledones* has never been doubted.

The remarkable similarity which M. de Mirbel‖ found to exist between *Piper*, *Saururus*, and *Nymphæa*, in the additional membrane, which in all these genera immediately invests the embryo, induced him to regard them as probably destined to constitute, together with *Nelumbo*, a distinct family, to which he proposed to add *Misandra* and *Gunnera*, the affinity of which to *Piper* had been indicated by M. de Jussieu. Richard, however, who had previously proposed to regard *Saururus* as the type of a new family, soon afterwards¶ elevated *Piper* (which he followed Ruiz and Pavon in subdividing into two) to the same rank, adding a new analysis of its seed, differing in no essential particular from that given by M. de Mirbel, and adopting the old opinion of their structure being monocotyledonous, the membrane enveloping the embryo forming in his opinion the true cotyledon, and the cotyledons of Gærtner and M. de Mirbel being the primordial leaves of a partially developed plumula. Such was the state of the question when Mr. Brown's** observations on the mode of formation of the sac, or additional membrane, of the embryo in the true *Nymphæaceæ*, applied by him to the elucidation of the structure of the seeds of *Piperaceæ* and of *Saururus* also, left no room for doubting that this membrane is in reality one of the coats surrounding the embryo, and not its cotyledon, as it had been considered by Richard. With these observations of Mr. Brown, those subsequently made by M. Adolphe Brongniart†† on the development of the ovulum of *Nuphar lutea* fully coincide.

Unaware that the question had thus been determined in Europe, Dr. Blume published, a short time afterwards, in the eleventh volume of the Transactions of the Batavian Society, a monograph of the *Piperaceæ* observed by him in Java and the neighbouring islands, preceded by some introductory remarks‡‡, in which he endeavoured to revive the opinion of their monocotyledonous structure, supporting his views not only by the characters of the seed, explained in conformity with the theory of Richard, but by those of the stem also, and by their mode of germination. In this process, however, as described by Dr. Blume, there is nothing which is not easily recon-

* *Ordines Naturales Plantarum, ed. Giseke*, p. 123.

† *Genera Plantarum*, p. 405.

‡ *Fruct. et Sem. Plant.* ii. p. 67. t. 92.

§ *Annales du Muséum*, tom. xvi. p. 447, 449. t. 19.

‖ l. c. p. 449.

¶ *Kunth, Nova Genera & Species, &c.* i. p. 39 & 50. t. 3.

** King's Narrative, &c. ii. p. 548.

†† *Annales des Sciences Naturelles*, tom. xii. p. 266. t. 39.

‡‡ These introductory remarks are only known to me by the extract contained in the *Annales des Sciences Naturelles*, tom. xii. p. 216: the characters of the species are repeated in the "*Enumeratio Plantarum Javæ*," p. 64, *et seqq.*

cileable with the dicotyledonous character of the embryo; and the stem, although possessing marked peculiarities, has at least one character, in its central pith and medullary rays, which has not yet been observed among monocotyledonous plants. Both pith and rays have indeed been denied to certain species of *Piper* by J. J. P. Moldenhawer*, as well as concentric rings and a true bark, the absence of which latter is also indicated by Dr. Blume; but the existence of both pith and medullary rays is obvious even in the smaller branches of many of the species, and has been noticed by Meyer and by Professor Lindley† in the older stems. The conclusion, therefore, to which Moldenhawer comes, that these generally recognized *Dicotyledones* (as it was necessary for the purposes of his argument to consider them, and as in truth they are,) differ in no one single particular from the structure regarded as peculiar to *Monocotyledones*, is not altogether correct. A further observation made by Dr. Blume, viz. that the oldest spiral vessels, and those which have acquired a woody consistence, occupy the circumference of the stem, while those more recently formed are seated towards its centre, deserves a careful examination, as adding an unexpected anomaly to those which have already been detected in the organization of dicotyledonous wood.

None of the species of *Piper* characterized in Dr. Blume's "Enumeratio," approaches, as far as can be judged from the specific distinctions there given, to the plant now figured; nor do any of the numerous *Peppers* collected by Hænke, and described by Opiz in the "Reliquiæ Hænkeanæ‡," appear to be nearly related to it: I had therefore presumed it to have remained still unknown, and had described it under a new generic name. But after the present sheet had been actually revised in print, the fourth part of Dr. Endlicher's "Genera Plantarum" arrived in England, and I there found the genus characterized by Dr. Blume under the name which I have adopted. His species, stated to be found in Java, appears to be identical with the present; but as I have no means of knowing what specific name he may have employed in the work referred to by Dr. Endlicher, I have retained that which I had previously given.

The characters of the genus *Ottonia*, established by Sprengel§ on a species of Pepper from Brazil, approach those of *Zippelia*, as regards the male organs and stigmata, the stamina and stigmata being both apparently regularly four in number, and the filaments persistent; but the surface of the fruit appears to have nothing to distinguish it from the more common Peppers. Two additional genera in this family, *Laurea* and *Dugagelia?*, have since been proposed by M. Gaudichaud||; but the characters and accompanying observations leave it doubtful whether the first-named genus really belongs to the family of *Piperaceæ* in its restricted sense, and the latter seems to be entirely founded on the foliaceous character of the subtending bracteæ. Another genus has also been characterized by Dr. Buchanan Hamilton¶, under the name of *Cryphæa*, the distinction of which is made to depend on a remarkable modification of the organs supporting the antheræ; but the plant on which it is founded has since been ascertained to be a species of *Chloranthus***.

Zippelia lappacea was found by Dr. Horsfield in Sumatra in 1818. I. J. B.

TAB. XVI. *Fig.* 1. *Zippelia lappacea*, of the natural size. *Fig.* 2. A flower, magnified. *Fig.* 3. The pistillum of the same, with the ovarium laid open. *Fig.* 4. A flower, after the falling off of the anthers, showing the subtending bractea, persistent filaments, ovarium, and stigmata. *Fig.* 5. A fruit. *Fig.* 6. A vertical section of the same, carried through the centre of the seed, showing the enlarged and persistent filaments, and the sac of the embryo with a part of its connecting thread. *Fig.* 7. The sac of the embryo removed.

---

* *Beyträge zur Anatomie der Pflanzen*, Kiel, 1812, p. 5, *note*.

† Natural System of Botany, ed. 2. p. 185.

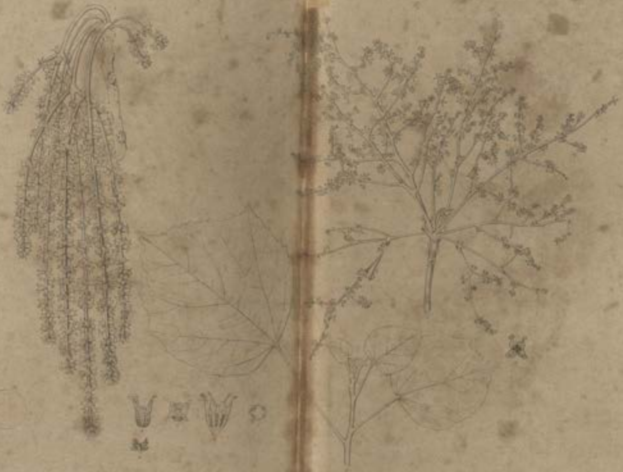
‡ tom. i. p. 150, *et seqq*.

§ *Neue Entdeckungen*, i. p. 255.—*Grundzüge*, t. 3. f. 4, 5.

|| *Voyage de l'Uranie, Botanique*, p. 513–4.

¶ Brewster's Edinburgh Journal of Science, vol. ii. p. 9, &c.

** See Dr. Wallich's List, No. 6881.



TETRAMELES NUDIFLORA, *R. Br.*

TAB. XVII.

TETRAMELES, *R. Br. in Denh. Narr., App.* p. 230.

CHAR. GEN. *Flores* dioici. *Masc. Perianthium* 4-fidum. *Stamina* 4, perianthii lobis opposita. *Fem. Perianthium* ovario adhærens, 4-dentatum. *Styli* 4, perianthii dentibus oppositi. *Stigmata* totidem, obliquè dilatata. *Ovarium* 1-loculare, apice foramine centrali hians. *Placentæ* 4 parietales polyspermæ.

Arbor *magna;* ramis *nudis flexuosis;* foliis *post anthesin evolutis, plùs minùs lobatis.* Flores *parvi, in spicis paniculatis numerosissimi.*

TETRAMELES *nudiflora*, R. Br.

Arbor procera. Ramuli teretiusculi, cortice fusco ruguloso obducti, medullâ copiosâ farcti, cicatricibus magnis foliorum anni præteriti conspicuè notati. Folia sparsa, post flores evoluta; (juniora) latè ovata, acuta vel acuminata, quandoque sublobata, inæqualiter grossè dentata, suprà lævigata, infrà albo-tomentosa, petiolis longitudine folii vel paulò brevioribus tomentosis suffulta. Flores dioici. Spicæ masculæ paniculatæ erectæ, femineæ subsimplices pendulæ elongatæ, fasciculatæ, ramulos nudos terminantes, 9—12-pollicares, rachibus ramisque filiformibus densè sericeo-pubescentibus; ramis (in masculis) alternis, inferioribus simpliciter ramosis, superioribus simplicibus. Flores numerosi, solitarii, bini, terni vel quandoque subverticillati. Flos masculus subsessilis. Calyx lineam circiter longus, patens, glaber, ad medium usque 4-fidus, lobis latè ovatis obtusis. Stamina 4, lobis calycinis opposita, et cum iisdem basi connata, initio inclusa, demùm elongata exserta; filamenta crassiuscula; antheræ dorso sub apice affixæ, subrotundæ, biloculares; loculis distinctis, introrsùm suturâ longitudinali dehiscentibus. Pollen minutum, subgloboso-ellipticum, hyalinum. Pistilli rudimentum? discus obsoletus, planiusculus, subtetragonus; angulis cum filamentis alternantibus. Flos femineus sessilis. Calyx basi hispidiusculus, glandulosus, ovario adhærens, subtetragonus, supernè paulò latior, lineas 2 circiter longus, 4-dentatus; dentibus brevibus, angulos terminantibus, latè ovatis, acutiusculis. Ovarium calycis figurâ; apice planiusculo subquadrato sulcis 8 exarato, e quibus 4 stylis respondentes magis conspicui, in foramen centrale 4-angulare abeuntes.

Styli 4, dentibus calycinis oppositi, crassiusculi, lineam ferè longi, intùs longitudinaliter sulcati. Stigmata incrassata, obliquè truncata, reflexa, subovata. Ovarium uniloculare; placentis 4 parietalibus cum stylis alternantibus, supernè sterilibus bifurcatis, ramulo quovis in stylum proximum lateraliter abeunte. Ovula numerosissima, biserialia, ascendentia, oblonga, funiculo brevi crassiusculo insidentia; foramine (et inde radiculâ) prope hilum posito.

The genus *Tetrameles* was named, in 1826, by Mr. Brown*, who at the same time pointed out the characters by which it is distinguished from *Datisca*, and founded on the two genera "an order very different from every other yet established," under the name of *Datisceæ*. Of this order a character has since been given by Dr. Bartling†, and adopted with little modification by Professor Lindley‡; but as *Tetrameles* was unknown to both botanists, and its distinctive marks, as given by Mr. Brown, were entirely overlooked, it will be necessary to modify the character still further in order to comprehend both the genera of a family, the members of which, although so intimately allied in all essential particulars, are yet in minor points so strikingly distinct.

With respect to *Datisca*, I may observe that the teeth of the calyx, although sometimes much reduced in size, always correspond in number with the styles, to which they are opposite as described by Jussieu§, and not alternate as in Gærtner's figure||. The supposed second species of *Datisca*, collected by Kalm in Pennsylvania, and described by Linnæus under the name of *Dat. hirta*, appears from the specimen in the Linnean Herbarium to be in no way related to *Datisca*, but belongs unquestionably to the genus *Rhus*. Indeed I have little hesitation in referring it, notwithstanding its contracted inflorescence, to the common *Rhus typhina*, with which its flowers (male only) seem perfectly to agree; for the marked decurrence and even confluence of the leaflets noticed in the Linnean description, although, I believe, hitherto undescribed in any of the pinnated species of *Rhus*, not unfrequently occurs in some of their very variable states. Professor Don's *Dat. Nepalensis*¶, referred by Dr. Wallich** to *Dat. cannabina*, offers, I think, sufficient characters to justify its separation from the species of the Levant.

Dr. Horsfield notes that *Tetrameles nudiflora* is the "*Weenong* of the Javanese. It is a large tree. I found it in full flower in several localities in the eastern provinces of the native princes' territories, in 1815, about the month of September, shortly before the rainy season. At this time the tree is perfectly naked, the leaves being more completely separated or shed than is usually the case in tropical climates; but the summit is beautifully ornamented with a luxuriant inflorescence, consisting of long, linear, pendulous spikes of a yellow colour, arising (clustered) from one point. This tree grows to a large size; the stem near the earth is irregularly indented or separated into compressed projections, which spread to a considerable distance; above these it is erect and nearly cylindrical. The bark is grey, with white blotches, almost smooth, or slightly furrowed. The branches are large, naked, smooth, suberect, or irregularly flexuose; the branchlets numerous, and subdivided in a similar manner."

I. J. B.

TAB. XVII. *Fig.* 1. A female panicle of *Tetrameles nudiflora*, of the natural size. *Fig.* 2. A male panicle. *Fig.* 3. A small branch, with young leaves. *Fig.* 4. A female flower, seen from the side, magnified. *Fig.* 5. The same, seen from above. *Fig.* 6. The same, with the ovarium laid open longitudinally. *Fig.* 7. A transverse section of the ovarium. *Fig.* 8. A portion of one of the placentæ, with ovules attached, more highly magnified. *Fig.* 9. A male flower, magnified.

---

* In Denham's Narrative, App. p. 230.

† *Ordines Naturales Plantarum*, p. 419.

‡ Natural System of Botany, p. 182.

§ *Genera Plantarum*, p. 445.

|| *Fruct. et Sem.* i. t. 30. f. 2.

¶ *Prodr. Fl. Nepal.* p. 203.

** List, No. 4664.



HELICIA JAVANICA.

TAB. XVIII.

HELICIA, *Lour. Fl. Cochinch.* p. 83.—Helittophyllum, *Blume, Bijdr.* p. 652.

CHAR. GEN. *Perianthium* tetraphyllum, regulare, foliolis apice recurvis. *Stamina* supra medium foliolorum inserta, iisque recurvatis exserta. *Squamulæ hypogynæ* quatuor, distinctæ v. connatæ. *Ovarium* dispermum; ovulis adscendentibus. *Stigma* verticale, clavatum. *Pericarpium* ligneo-coriaceum, indehiscens, monospermum. *Semen* apterum.

Arbores (*Asiaticæ*). Folia *alterna, rarò verticillata, simplicia, integerrima v. dentata, glabra.* Spicæ *axillares, quandoque terminales, racemosæ, floribus geminis, paribus uni-bracteatis, pedicellis plùs minùs connatis.* Char. ex. R. Br. in Linn. Trans. x. p. 190, et Prodr. Fl. Nov. Holl., Suppl. I. p. 32.

HELICIA *Javanica,* foliis alternis v. rariùs ternatim subverticillatis obovatis serratis racemum axillarem subæquantibus, pedicellis ferè ad basin distinctis cum perianthiis ovariisque glabris, squamulis distinctis glabris.

Helittophyllum Javanicum. *Blume, Bijdr.* p. 652.

DESCR. Arbuscula. Ramuli teretiusculi, cortice brunneo lævigato obducti. Folia sparsa, v. 3 aut 4 subverticillata, 6—8 pollicaria, pollices 2 v. 3 lata, coriacea, obovata, basi angustata subcordata, apice acuta, in omni margine argutè serrato-dentata; suprà glaberrima, lucida; infrà glabra, pilis raris brevissimis adpressis ope lentis tantùm videndis obsita. Petioli brevissimi, glanduloso-incrassati, post foliorum lapsum cicatrices conspicuas relinquentes. Racemi axillares v. terminales, 8-pollicares; rachi pedicellisque florum glabratis. Pedicelli geminati, 3 v. 4 lineas longi, basi connati; bracteâ unicâ parvâ ovatâ acutâ singulum parem subtendente, alterâque simillimâ sed minore juxta solutionem cujusvis pedicelli. Perianthium album, pollicare, tetraphyllum; foliolorum laminis ante expansionem clavam ovali-subrotundam tubo sextuplò breviorem efformantibus; flore aperto laminis ovatis reflexis, unguibus linearibus spiraliter revolutis. Stamina 4; filamenta nulla; antheræ intra laminas foliolorum perianthii concavas sessiles, demùm laminis reflexis exsertæ, oblongæ, biloculares, rimâ longitudinali dehiscentes, connectivo prominulo

apiculatæ. Pollen 3-angulare, angulis pellucidis. Squamulæ hypogynæ 4, distinctæ, cum perianthii foliolis alternantes, majusculæ, carnosæ, ovali-oblongæ. Ovarium subsessile, glabrum, ovatum, uniloculare; ovulis duobus prope basin affixis adscendentibus. Stylus cum ovario continuus, a basi latiusculâ filiformis, striatus, longitudine perianthii. Stigma clavatum, oblongum, angulato-sulcatum. Pedicelli fructûs incrassati, lignosi. Pericarpium coriaceo-lignosum, nutans, ovatum, angulatum, plùs quàm pollicare, styli basi persistente brevitèr mucronatum, indehiscens, monospermum. Semen ovatum omninò apterum; testæ dimidio superiore reticulatim rugoso. Cotyledones magnæ, crassæ, subinæquales; radicula parva, hilo proxima.

In his monograph of *Proteaceæ* Mr. Brown referred the genus *Helicia* of Loureiro to *Rhopala* of Aublet; but having afterwards become acquainted with the fruit of the former, he re-established Loureiro's genus, comprehending in it all the known Asiatic *Proteaceæ*, on the distinctive marks which I have adopted in the generic character above given. Dr. Blume had in the mean time founded on the present species (the only one known to him) the genus *Helittophyllum*, a name evidently derived, like that of Loureiro, from the spiral torsion of the foliola of the expanded perianthium; but he does not appear to have been aware of its identity with *Helicia*. This is probably to be accounted for from the singular oversight committed by Loureiro of describing the connate hypogynous scales as a quadrifid calyx; an error which may well be pardoned in him, when we find Cavanilles* falling into the same mistake in his character of another Proteaceous genus, *Lambertia*, where he describes a "Calyx partialis, minimus, monophyllus, tubulosus, inter corollam et germen positus."

The species of *Helicia* characterized by Mr. Brown† in his original memoir on *Proteaceæ* were three in number, viz. *Hel. Cochinchinensis*, Lour., *Hel. Moluccana*, collected by Christopher Smith in Amboyna, and *Hel. serrata*, found by the same collector in Nusalaut, and also obtained by Roxburgh from the Malayan Archipelago. To these Roxburgh‡ added *Rhopala excelsa* from Chittagong, and *Rhop. robusta* from Sylhet, together with a species from the island of Penang, which he regarded as *Hel. Moluccana*, but which his description proves to be very different. This last-named species is probably the same with one afterwards found by Dr. Jack in the same island, and described by him § under the name of *Rhop. attenuata*. Dr. Jack also found in a garden at Penang a second species, which he described as *Rhop. Moluccana*; but this again is a remarkably distinct plant, to which, on account of the length of its petioles, I have given the name of *Hel. petiolaris*. He subsequently added another species, found at Tappanuly on the western coast of Sumatra, to which he gave the name of *Rhop. ovata*. In Dr. Wallich's "List" ‖ are enumerated six species, viz. *Rhop. excelsa*, Roxb., *Rhop. glabrata*, Wall., *Rhop. attenuata*, Jack, *Rhop. Moluccana*. R. Br., *Hel. robusta*, and *Hel. macrophylla*, Wall. The specimens of the first of these, from Amherst and Moalmyne, differ slightly in the form of their leaves from Roxburgh's Chittagong plant, but agree in every other particular. I cannot distinguish the second species, *Rhop. glabrata*, Wall., collected in Tavoy, from *Rhop. robusta*, Roxb., with which *Rhop. macrophylla*, Wall. must also be combined. The two remaining species, of both of which there are specimens in Dr. Wallich's collection sent by Jack himself, I have already noticed. With these corrections, and with the addition of Dr. Blume's *Helittophyllum Javanicum*, the number of species of *Helicia* already indicated amounts to nine; and there remain to be added from Dr. Horsfield's collection two others, to which I have given the names of *Hel. obovata* and *Hel. oblongifolia*. The following characters will afford a synoptical view of the eleven species at present referrible to the genus.

1. *Hel. Cochinchinensis*, "foliis alternis ovato-ellipticis brevitèr acuminatis planis extra medium subserratis racemum axillarem subæquantibus, pedicellis cum calycibus ovariisque glabris" (*R. Br.*), squamulis connatis.

* *Icones*, vi. p. 31. † Linnean Transactions, x. p. 191, 192. ‡ *Flora Indica, Ed. Wall.* i. p. 364—6.
§ Malayan Miscellany, No. 2. p. 10. ‖ Nos. 1038—1041, 2702 & 3661.

Helicia Cochinchinensis. *Lour.! Fl. Cochinch.* p. 83.
Rhopala Cochinchinensis. *R. Br.! in Linn. Trans.* x. p. 192.
Heliciæ sp. *R. Br. Prodr. Fl. Nov. Holl., Suppl.* I. p. 32.
Hab. in sylvis Cochinchinæ (*exam. s. a Lour. ipso in Herb. Banks.*).

2. *Hel. attenuata,* foliis alternis ellipticis acuminatis integerrimis v. rariùs pauci-dentatis racemum axillarem subæquantibus, pedicellis cum perianthiis ovariisque glabris, squamulis connatis.
Rhopala Moluccana. *Roxb. Fl. Ind. ed. Wall.* i. p. 364. (*nec R. Br.*).
Rhopala attenuata. *Jack! in Malay. Misc.* No. 2. p. 10. *Wall.! List,* No. 1040: 1, 2.
Hab. in Insulâ Penang, *Jack*; et Monte Pundua, *Wallich* (*exam. s. in Herbb. Banks. et Soc. Linn.*).
Obs. In adnotatione cl. Wallichii sub hoc numero pro "Rh. robusta, *Roxb.* vix diversa" lege "Rh. racemosa, *Roxb.*" quo sub nomine, manu Roxburghii scripto, extat in Herb. Ind. Soc. Linn. specimen in omnibus huic speciei simillimum. *Rh. robusta,* Roxb. valdè diversa.

3. *Hel. Moluccana,* "foliis alternis integerrimis ellipticis planis venulosis subreticulatis spicâ longioribus, pedicellis calycibusque glabris" (*R. Br.*), squamulis distinctis glabris.
Rhopala Moluccana. *R. Br.! in Linn. Trans.* x. p. 191.
Heliciæ sp. *R. Br. Prodr. Fl. Nov. Holl., Suppl.* I. p. 32.
Hab. in Insulâ Amboynâ, *Christopher Smith* (*exam. s. in Herb. Banks.*).

4. *Hel. robusta,* foliis alternis obovato-oblongis acuminatis serratis racemis axillaribus longioribus, pedicellis cum perianthiis ovariisque glabris, squamulis connatis.
Rhopala robusta. *Roxb.! Fl. Ind. ed. Wall.* i. p. 366.
Helicia robusta. *Wall.! List,* No. 2702.
Rhopala glabrata. *Wall.! List,* No. 1039.
Helicia macrophylla. *Wall.! List,* No. 3661.
Hab. in montibus Sylhet, *Roxburgh, Wallich*; Tavoy, *Wallich* (*exam. s. in Herbb. Banks. et Soc. Linn.*).
Obs. Nullam observare potui differentiam inter specimina Wallichiana hùc relata.

5. *Hel. Javanica,* foliis alternis v. rariùs ternatim subverticillatis obovatis serratis racemum axillarem subæquantibus, pedicellis ferè ad basin distinctis cum perianthiis ovariisque glabris, squamulis distinctis glabris.
Helittophyllum Javanicum. *Blume, Bijdr.* p. 652.
Hab. in Insulâ Javâ, *Horsfield* (*exam. s. in Herb. Horsf.*).

6. *Hel. obovata,* foliis alternis obovatis remotè serratis racemum axillarem subæquantibus, pedicellis ad medium ferè connatis cum perianthiis ovariisque glabris, squamulis in annulum lacero-fimbriatum connatis.
Hab. in Insulâ Javâ, *Horsfield* (*exam. s. in Herb. Horsf.*).

7. *Hel. oblongifolia,* foliis alternis oblongis acuminatis basi attenuatis integerrimis racemum subæquantibus, pedicellis ferè ad basin distinctis cum perianthiis ovariisque glabris, squamulis in annulum obsoletè ciliato-dentatum connatis.
Hab. in Insulâ Javâ, *Horsfield* (*exam. s. in Herb. Horsf.*).

8. *Hel. excelsa,* foliis alternis obovato-oblongis acuminatis sæpè versus apicem grossè dentatis, pedicellis cum perianthiis ovariisque tomentosis, squamulis distinctis glabris.

Rhopala excelsa. *Roxb.! Fl. Ind. ed. Wall.* i. p. 365.

β. foliis elongatis integerrimis.

Rhopala excelsa. *Wall.! List,* No. 1038.

Hab. α. in sylvis Chittagong, *Roxburgh*; *β.* in Orâ Martabaniæ, apud Amherst et Moalmyne, *Wall.* (*exam. s. in Herbb. Banks. et Soc. Linn.*).

9. *Hel. serrata,* "foliis alternis latè ellipticis parùm acuminatis serratis racemo axillari longioribus: basi subattenuatâ integerrimâ; paginis discoloribus, pedicellis cum calycibus ovariisque tomentosis" (*R. Br.*), squamulis distinctis barbatis.

Rhopala serrata. *R. Br.! in Linn. Trans.* x. p. 192. *Roxb. Fl. Ind. ed. Wall.* i. p. 365.

Heliciæ sp. *R. Br. Prodr. Fl. Nov. Holl., Suppl.* I. p. 32.

Hab. in Insulâ Moluccanâ Nusalaut, *Christopher Smith*; in Insulis Archipelagi Malayani, *Roxburgh* (*exam. s. in Herb. Banks.*).

10. *Hel. petiolaris,* foliis alternis longè petiolatis obovatis obtusis integerrimis racemum axillarem subæquantibus (pedicellis cum perianthiis ovariisque glabris, squamulis connatis?).

Rhopala Moluccana. *Jack! in Malay. Misc.* No. 2. p. 10. *Wall.! List,* No. 1041 (*nec R. Br., nec Roxb.*).

Hab. lecta in horto Insulæ Penang, *Jack*; apud Singapore spontanea, *Wallich* (*exam. s. in Herbb. Banks. et Soc. Linn.*).

Obs. In specimine Herb. Banks. flores nulli, in altero Herb. Soc. Linn. flores racemi unici haud expansi. Descriptio florum ex specimine altero hujus Herbarii racemis pluribus onusto, sed foliis orbato, ideoque dubia.

11. *Hel. ovata,* "foliis subsessilibus ovatis utrinque acutis integerrimis, pedicellis brevissimis cum calycibus ovariisque levissimè tomentosis."—*Jack.*

Rhopala ovata, *Jack in Malay. Misc.,* No. 7. p. 95.

Hab. ad Tappanuly in Insulâ Sumatrâ, *Jack.*

Dr. Horsfield states that the Javanese name of *Helicia Javanica* is *Kendung.* "This species was found in 1804, and subsequently noticed occasionally on the higher ranges of the island, about 3000 feet above the ocean. Four localities are particularly mentioned in my Journals; viz. mountain Tengger, at the eastern extremity, and mountains Ungarang, Prahu, and Taggal of medial Java: but it is by no means abundant. Its habit is shrubby or arborescent; irregular in growth, various stems rising from one point and spreading in all directions. The appearance of the shrub at the period of inflorescence is extremely beautiful; the flowers, of a brilliant white colour, are produced at the extremity of the smaller branches in long slender spikes, with which the vivid glossy green of the leaves forms a pleasing contrast." I. J. B.

Tab. XVIII. *Fig.* 1. A branch of *Helicia Javanica,* of the natural size, in flower. *Fig.* 2. A portion of a raceme in fruit. *Fig.* 3. A flower, slightly magnified. *Fig.* 4. The lamina of one of the foliola of the perianthium, with its anther attached, more highly magnified. *Fig.* 5. A flower, with the perianthium and style removed, showing the ovarium surrounded by the hypogynous scales. *Fig.* 6. The ovarium laid open. *Fig.* 7. The stigma. *Fig.* 8. One of the hypogynous scales. *Fig.* 9. Grains of pollen. *Fig.* 10. A fruit laid open. *Fig.* 11. The seed. *Fig.* 12. The same, with the cotyledons separate.



RHODODENDRUM JAVANICUM.

RHODODENDRUM JAVANICUM.

TAB. XIX.

RHODODENDRUM *Javanicum*, foliis ovalibus utrinque acutis glabris subtùs punctato-squamulosis, pedunculis glabris, calyce obsoleto, corollâ infundibuliformi-campanulatâ: limbi laciniis latè obovatis emarginatis, ovario 5-loculari.

Vireya Javanica, *Bl. Bijdr. p.* 854.

DESCR. Frutex divaricatim ramosus. Rami læves, albidi, foliorum cicatricibus magnis tumidulis notati. Folia conferta, sparsa, coriacea, caduca, petiolis brevibus crassis insidentia, elliptico-lanceolata, basi acuta, apice subacuminata, 3 pollices longa, pollicem lata, integerrima, nervo medio crasso donata; suprà viridia, glabra; infrà squamulis minimis punctiformibus peltatis ferrugineis adspersa. Gemmæ terminales squamis numerosis, oblongis, scariosis, citò caducis, pollicaribus, involucratæ. Fasciculus sessilis, 6—10-florus. Flores pedunculis pollicaribus ferrugineo-squamulosis insidentes, magni, speciosi, in apicibus pedunculorum incrassatis obliquè inserti. Calyx inconspicuus, e margine scilicet obsoletissimè 5-dentato, dente impari antico. Corolla monopetala, infundibuliformi-campanulata; tubo e basi angustâ supernè gradatìm latiore; limbo patulo profundè 5-fido, laciniis obovatis, longitudine tubi, subæqualibus, expansione usque bi-pollicaribus. Color (teste Blumio, et ex icone picto Horsfieldiano) saturatè aurantiacus. Stamina 10, longitudine corollæ, filamentis liberis parùm inæqualibus, planis, angustis, basi pilosâ paulò latioribus, disco hypogyno unà cum corollâ, sed insertione distinctâ, affixis. Antheræ parvæ, oblongæ, posticè in medio dorso affixæ, biloculares, apice poro gemino subrotundo dehiscentes. Pollen læve, grano quovis e granulis 4 tetrahedrè connatis composito. Ovarium oblongum, squamulis minutis adspersum, pubescens, 5-loculare, loculis corollæ lobis oppositis. Placentæ in dissepimentorum marginibus inflexis axi centrali adhærentibus, ovulis numerosissimis sursùm imbricatis onustæ. Stylus filiformis, simplex, declinatus, longitudine corollæ, indusio brevi cyathiformi stigmata 5 capitata vaginante terminatus. Capsula stylo persistente coronata, lineari-oblonga, basi apiceque attènuata, pollicaris, squamulosa, longitudinaliter 5-sulcata, 5-locularis, 5-valvis, polysperma. Dehiscentia septicida. Placentæ ab axi centrali pariter ac a dissepimentis maturitate solubiles. Semina numerosissima, scobiformia, prope basin affixa, utrinque alato-caudata; caudis longis subsetiformibus, dentato-ciliatis, crispatis.

The two species of *Rhododendrum* here figured and described, together with three others found in Java and Celebes, constitute the genus *Vireya* of Dr. Blume*. But the characters assigned to that genus differ in no respect from those of *Rhododendrum*; the two distinguishing marks on which Dr. Blume relies, viz. the minuteness of the calyx, and the distinct insertion of the stamina and corolla, being equally present in the most truly characteristic species of the older genus. Professor Don has given, in his brother's edition of Miller's Gardener's Dictionary†, an arrangement of the genus *Rhododendrum* divided into several sections, to the first of which both the species in question would belong; but whether that arrangement be adopted or not, the *Rhod. Javanicum* must still be placed in close proximity with *Rhod. Ponticum*, and the *Rhod. retusum* associated with *Rhod. ferrugineum*. To the latter the name of *Rhododendrum* was originally applied by Cæsalpinus‡, who first revived that name among the moderns; for which reason, as well as on account of its being the species from which Linnæus derived his generic characters, it must always be regarded as the true type of the genus, should it hereafter be thought advisable to restrict its limits. The name *Vireya* must therefore, in so far at least as the present species are concerned, sink into a synonym of *Rhododendrum*; and there seems no reason for believing that the remaining species offer any distinguishing characters.

I have said above that *Rhod. Javanicum* is intimately related to the common *Rhod. Ponticum*: it is also allied, but less closely, to *Rhod. campanulatum*, Don§, which, as Mr. Don justly observes, has the largest flowers that occur in the genus, with the exception of the Javanese species now described. From both those plants, however, *Rhod. Javanicum* is distinguished by the less coriaceous texture, and by the form of its leaves; and by the greater comparative length of the tube or undivided portion of its corolla. It differs further from *Rhod. Ponticum* in the breadth of the laciniæ of its corolla, or rather of the free portion of its petals, which are also much more distinctly emarginate; and from *Rhod. campanulatum* in the want of the ferruginous tomentum, which covers the under surface of the leaves in the latter, and in the much more obsolete character of its calycine lobes, which in the latter are conspicuous, and dilated into a rounded form. The increased number of the cells of the ovarium (in this species, however, only six,) has induced Mr. Don to place *Rhod. campanulatum* in his second section of the genus, along with plants, the cells of whose ovaria are generally still more numerous; but the number six not uncommonly occurs in the cells of the ovary of several of the species of his first division, in which they are usually no more than five.

It will be observed that in this and the succeeding species I have described what is usually regarded in the light of a capitate stigma, as an indusium surrounding the true stigmata, which are distinct from each other, equal in number to the cells of the ovarium, partially or wholly adherent to the inner surface of the indusium, sometimes slightly projecting beyond it, and generally a little capitate. Mr. Brown, to whom I am indebted for calling my attention to this subject, long since showed me that a similar organization, more or less obvious, occurs very generally in the family, demonstrating it more particularly in *Salaxis* and such of the other Heaths as are commonly described as having a large peltate stigma; the part so called being in fact the indusium, and the true stigmata, in number equal to the cells of the ovarium, being generally sufficiently evident on a careful examination within it. In several of the genera formed from the dismemberment of the old genus *Erica*, by R. A. Salisbury and Professor Don, the separation of the stigmata has indeed been noticed, but it does not appear ever to have been suspected that it was general in the family, nor has any attention been paid to the nature of the rim, pelta, or cup, by which the stigmata are in all cases immediately surrounded. The relation which this organ bears to the more strongly marked indusium of *Goodenovieæ* is too obvious to escape attention; and a careful investigation of

---

* *Bijdragen tot de Flora van Nederlandsche Indie*, p. 854. † vol. iii. p. 843.

‡ *De Plantis*, lib. 15, cap. 17. As regards the *Rhododendrum* of Pliny, it must ever remain doubtful whether the plant intended thereby were the *Rhod. Ponticum*, or the *Azalea Pontica* of Linnæus.

§ In Mr. G. Don's edition of Miller's Gardener's Dictionary, iii. p. 844.

its nature in *Ericeæ* can hardly fail to throw some light on the origin of that singular and hitherto apparently anomalous addition to the usual structure of the pistillum.

Rhod. Javanicum is, according to Dr. Horsfield's notes, called by the Javanese "*Kambang Kepeeting.* It is found on the volcanic range extending through Java, very generally at an elevation of about 4000 feet above the ocean, in dense forests, and was first discovered in 1804." I. J. B.

TAB. XIX. *Fig.* 1. A branch of *Rhododendrum Javanicum*, of the natural size. *Fig.* 2. The pistillum. *Fig.* 3. One of the stamina. *Fig.* 4. A ripe capsule. *Fig.* 5. A transverse section of the same. *Fig.* 6. One of the seeds, magnified.



RHODODENDRUM RETUSUM.

RHODODENDRUM RETUSUM.

TAB. XX.

Rhododendrum *retusum*, ramulis exasperatis, foliis angustè obovatis retusis subtùs squamulosis, pedunculo pubescenti tubum corollæ angusto-campanulatæ subæquante, genitalibus exsertis.

Vireya retusa, *Bl. Bijdr. p.* 856.

Descr. Frutex ramosus. Rami ramulique albidi, teretes, granuloso-exasperati, foliorum cicatricibus tumidulis notati. Folia brevi-petiolata, coriacea, hic illic præsertìm in apicibus ramulorum conferta et quasi verticillata, angustè obovata, retusa, pollicem vel sesqui-pollicem longa, dimidium pollicem lata, marginibus reflexa; suprà viridia, parcè peltato-squamulosa; infrà ferruginea, squamulis peltatis saturatioribus numerosissimis punctiformibus, glandulas quasi referentibus, adspersa. Gemmæ terminales, squamis scariosis ovatis ferrugineis squamulosis tenuissimè ciliatis obsitæ. Fasciculus 3—8-florus, in apice ramuli sessilis. Pedunculi plùs quàm semipollicares, pubescentes, apice parùm incrassati et obliqui. Flores (teste Blumio) coccinei. Calyx minimus, pilosus, 5-dentatus, dente antico paulò longiore. Corolla angustè campanulata, squamuloso-glandulosa, minutè puberula; tubo pollicari; limbo brevi, 5-fido, lobis patulis expansione semipollicaribus. Stamina 10, libera, disco hypogyno unà cum corollâ inserta; filamentis subæqualibus, planis, angustis, glabris, basi vix latioribus. Antheræ exsertæ, medio dorso affixæ, ovales, biloculares, poro gemino subrotundo apicali dehiscentes. Pollen e granis 4 tetrahedrè conflatis compositum. Ovarium oblongum, pilosum, longitudinaliter 5-sulcatum, 5-loculare, loculis corollæ lobis respondentibus. Ovula numerosa, minuta, in placentis 5 e marginibus dissepimentorum secus axin centralem inflexis sursùm imbricata, subsessilia, prope basin affixa. Stylus filiformis, filamentorum longitudine, in indusium brevem cyathiformem, stigmata 5 brevia capitata subinclusa foventem, desinens. Capsula glanduloso-squamulosa, pentagona, basi apiceque subæqualis, dimidio pollice paulò longior, 5-locularis, 5-valvis, septicido-dehiscens; placentis 5 linearibus axi centrali adnatis, demùm solubilibus, polyspermis. Semina scobiformia, sursùm imbricata, basi apiceque alata; alis lacero-fimbriatis.

This handsome shrub, as has been mentioned in the preceding article, belongs to the same division of the genus with *Rhod. ferrugineum*, the original species to which the name of *Rhododendrum* was in modern times applied. To the same natural section, and in close proximity with both, I am inclined to refer Dr. Wallich's

*Rhod. lepidotum**, and also, as far as can be judged from the not very perfect specimens in the Banksian Herbarium, the *Rhod. anthopogon*† of the same author, notwithstanding the comparative shortness of the tube of the corolla in the former instance, and the reduced number of stamina (8 only, as stated by Professor Don) in the latter. The last-named species appears to me, in its more essential characters, so nearly allied to *Rhod. ferrugineum*, that I cannot admit the propriety of placing it in a distinct section, with a subgeneric name, solely on account of the absence of two of the usual stamina; and the regular degradation which takes place in the length of the tube of the corolla, from *Rhod. retusum*, through *Rhod. ferrugineum*, to *Rhod. lepidotum*, seems to prove that the mere abbreviation of that organ can scarcely be regarded as a sufficient ground for placing the last-named species at the head of another distinct section, composed besides of plants much less obviously related to it than those from which it is thus dissevered.

Comparing these three species and the *Rhod. anthopogon* more closely together, we shall find that *Rhod. ferrugineum* differs from our plant in the absence of tubercular asperities on its smaller branches; in its lanceolate oblong leaves with a slightly attenuated base; in its larger and more copious scales, occupying on the leaves the inferior surface alone; in the absence of pubescence on its peduncles, which are clothed only with the glandular scales; in the shortness of the tube of its corolla, scarcely exceeding one half of the length of that of the Javanese and Sumatran species; in its included stamina with naked filaments; and in its comparatively shorter capsule. *Rhod. lepidotum* differs in having fewer asperities on the smaller branches, and towards the extremities only; in the shape of the leaves, which more nearly resemble those of *Rhod. ferrugineum*, but have the glandular scales scattered over both surfaces; in its scaly, and not pubescent, peduncles; in the still greater abbreviation of the tube of its corolla, which is very shortly campanulate; in the obtuse segments of its calyx, which are more than a line in length; and in its included stamina. In *Rhod. anthopogon* the smaller branches are merely hispid; the leaves are oval, slightly retuse, and densely covered on the under surface with ferruginous, somewhat paleaceous scales; the peduncles are very short and pilose; the segments of the calyx are more than a line in length, linear, obtuse, and bearded at their tips; the tube of the corolla is very short and bearded internally; and the stamina (8 in number, according to Mr. Don) included.

These three are the only species which it appears necessary to compare immediately with *Rhod. retusum*, although there are several others, such as *Rhod. hirsutum*, &c. which manifestly belong to the same division of the genus.

Dr. Horsfield found *Rhod. retusum* "in the island of Sumatra, in 1818, on a journey from Padang to Menangcabo, in shaded situations about 3000 feet above the ocean." It is also found, according to Dr. Blume, on the heights of the mountains of the western part of Java. I. J. B.

TAB. XX. *Fig.* 1. A branch of *Rhododendrum retusum*, of the natural size. Fig. 2. A flower. *Fig.* 3. The pistillum. *Fig.* 4. A stamen. *Fig.* 5. Its anther, magnified, seen from within. *Fig.* 6. The same, seen from without. *Fig.* 7. The ripe capsule. *Fig.* 8. One of the seeds.

---

* List, No. 758.—D. Don in G. Don's System of Gardening and Botany, vol. iii, p. 845. † List, No. 759.—D. Don, l. c.

CYRTOCERAS REFLEXUM.

TAB. XXI.

CYRTOCERAS.

CHAR. GEN. *Corolla* rotata, 5-fida, reflexa. *Tubus stamineus* longè exsertus; *corona* pentaphylla, foliolis carnosis lanceolatis erectis, basi in cornu recurvatum productis. *Antheræ* membranâ terminatæ. *Massæ pollinis* basi affixæ, conniventes, compressæ. *Stigmatis discus* depressus, papillâ acutiusculâ. *Styli* elongati.

Frutex? Folia *opposita*, (*verosimiliter*) *membranacea*. Umbellæ *interpetiolares v. terminales*, *pedunculatæ*, *multifloræ*. Flores *majusculi; annulo corollæ faucis barbato*.

CYRTOCERAS *reflexum*.

DESCR. Ramuli obsoletè tetragoni, lignosi, medullâ copiosâ farcti, cortice glabro rugosiusculo virescente obducti. Folia opposita, oblonga, parùm acuminata, basi attenuata, breviter petiolata, caduca, 4—6 pollices longa, 1—$1\frac{1}{2}$ lata, verosimiliter (ex sicco) membranacea, venulosa, utrinque glabra, integerrima. Umbella terminalis interpetiolaris, multiflora. Pedunculus communis pollicaris, glaber. Bracteæ pedicellorum bases subtendentes plurimæ, parvæ, subrotundæ, ciliolatæ. Pedicelli sesquipollicares, subæquales, filiformes. Flores majores. Calyx parvus, 5-partitus; laciniis ovatis, obtusis, membranaceis, ciliolatis. Corolla subcarnosa, extùs glabra, intùs minutè pubescens, ultra medium 5-partita, ferè ad basin usque plicato-reflexa; fauce annulo carnoso barbato auctâ; laciniis lanceolatis, acutis, tubo stamineo longè exserto duplò ferè longioribus, marginibus revolutis. Corona staminea e foliolis 5 carnosis medio tubo stamineo adnatis, erectis, lanceolatis, extùs sulcatis, stigmatis discum longè superantibus, basi extùs productis in cornu lanceolatum, ejusdem ferè longitudinis, sursùm falcato-recurvatum, subtùs sulcatum, suprà carinatum. Stamina 5, coronæ foliolis opposita, connata in tubum cum stigmatis disco supernè cohærentem, 10-lamellatum; lamellis per paria cum foliolis coronæ alternantia approximatis. Antheræ liberæ, ovatæ, margine membranaceâ cinctæ, loculis infernè divergentibus. Massæ pollinis compressæ, dimidiato-oblongæ, margine internâ rectâ, lineâ pellucidâ (dehiscentiam indicante) notatâ. Ovaria 2, cum



CYRTOCERAS REFLEXUM.

stylis intra tubum stamineum occulta, libera, ovato-lanceolata, 1-locularia, polysperma; styli elongati, infernè liberi, supernè connati in laminam (stigma verum?) linearem, binervosam, apice in stigmatis discum desinentem. Discus pentagonus, depressus, papillâ centrali acutiusculâ mucronatus; angulis glandulas 5, cum antheris alternantes, in sulcis totidem gerentibus. Glandulæ parvæ, rhomboidales; singulæ in partes duas longitudinaliter solubiles, cruribus lateralibus brevissimis pollinis massas ex antherarum utrinque vicinarum loculis proximis basi affigentes. Massæ pollinis e loculis extractæ disco stigmatis circa ejus mucronem incumbentes.

The plant above described is so nearly related to *Hoya*, that it might almost with propriety have been referred to that genus, were not some of its characters so remarkable as obviously to require the formation of a distinct section for its reception. Between this and the establishment of a separate genus there is little real distinction; and the latter will probably be regarded as the preferable alternative in a family in which it has already been found expedient, for the purpose of forming natural subdivisions, to have recourse in many instances to characters of no greater importance, and much less obvious, than those of the genus now proposed.

The principal distinctive character of *Cyrtoceras* is derived from the great comparative elongation of the whole of its sexual apparatus, which in *Hoya* is as remarkably depressed. The inner angle of the foliola of the *corona staminea*, which in *Hoya* forms a mere tooth incumbent on the anthera, is produced in *Cyrtoceras* into an erect lanceolate process, twice as long as the anthera, and equal in length to the external horn of the base of the foliola. This horn, by its evident analogy to the body of the foliolum in *Hoya*, proves the latter to be merely a similar appendage (of enormous comparative size) to the tooth; which is equally shown, by the analogy of *Cyrtoceras*, to be the true lamina of the *foliolum coronæ*. In the various species of *Hoya* considerable differences are found in the form of these appendages; but in none with which I am acquainted do they approach in shape to the horns of *Cyrtoceras*, which in the entire flower may be compared to the overhanging and recurved margins of the roof of a Chinese pagoda, while the erect and connivent portions of the foliola represent its attenuated apex.

The elongation of the *tubus stamineus*, and the consequent elevation of the stigmatic disk, are necessarily accompanied by a corresponding elongation of the styles, which, instead of being immediately fixed by their free apices to the under surface of the disk, become united near the middle of their course, form by their union a linear lamella furnished with two parallel vascular cords, which is probably the true stigma, and thus obtain a lengthened medium of connexion with the disk. As another consequence of this general elongation, and by means also of the complete reflection of the corolla, the annular enlargement of the faux of the latter assumes a somewhat tubular form, and becomes remarkably conspicuous. A similar thickening of the faux exists in *Hoya* and in other Asclepiadeous genera, but rarely becomes so obvious as in the present instance.

It is possible that this plant may have been already described by Dr. Blume, but I have at present no means of ascertaining the fact, the only copy of his "Bijdragen" to which I have access being unfortunately deficient in the sheets containing the *Asclepiadeæ*. Mutilated specimens, apparently of the same species, or at least of a very nearly related plant, exist among the collections of Father Camel, in the Sloanean Herbarium (vol. 231) in the British Museum. These were gathered in the Island of Luçon, and were sent to Petiver, about the year 1700, under the name of "Arbor Dago, flore Borraginis." They are not, I believe, noticed in the Syllabus of Camel's plants, given in the Appendix to Ray's "Historia Plantarum;" nor is the plant figured among Camel's drawings also in the Sloanean collection.

From Dr. Horsfield's Notes it appears that the Javanese name of this plant is *Kappal*, and that it grows in various localities in the eastern parts of Java, at no great distance from the sea-shore. I. J. B.

TAB. XXI. *Fig.* 1. A branch of *Cyrtoceras reflexum*, of the natural size. *Fig.* 2. A flower, with one of the *foliola coronæ* and the corresponding anther removed, of twice the natural size. *Fig.* 3. An anther, seen from within. *Fig.* 4. Pollen masses attached to one of the stigmatic glands, more highly magnified.

ARGOSTEMMA MONTANUM, *Bl.*

TAB. XXII.

ARGOSTEMMA, *Wall. in Roxb. Fl. Ind., Ed.* 1, *vol.* 2, *p.* 224.

CHAR. GEN. *Calyx* 5- (rariùs 3—7-) fidus. *Corolla* rotata; limbo 5- (rariùs 3—7-) partito; æstivatione valvatâ. *Stamina* imo corollæ tubo inserta; antheris exsertis, conniventibus, sæpiùs rostratis. *Stylus* filiformis. *Stigma* capitatum. *Capsula* subglobosa, depressa, bilocularis, lobis calycinis et disco carnoso coronata; hoc secedente in apice dehiscens. *Semina* numerosissima, angulata.

Herbæ *humiles, plerumque pube brevi e pilis simplicibus articulatis vestitæ.* Caulis *sæpissimè simplex.* Folia *opposita, altero sæpè nano, vel paribus approximatis quandoque pseudo-verticillata.* Stipulæ *interpetiolares foliaceæ, utrinque solitariæ, persistentes.* Pedunculi *terminales aut rariùs axillares, apice flores plures umbellatos vel umbellato-cymosos gerentes, rariùs uniflori, rarissimè in spicas producti.* Flores *albi, plerumque parvi, illos Solani quodammodo referentes.*

ARGOSTEMMA *montanum*, foliis pluribus subæqualibus ovatis acuminatis utrinque puberulis petiolatis, umbellâ simplici 4—6-florâ, corollâ pentamerâ, antheris cohærentibus rostratis.

Argostemma montanum. *Bl. in Dec. Prodr.* 4, *p.* 418.

DESCR.—Radix repens, hinc inde radiculas plurimas filiformes fibrillosas demittens. Caulis ascendens, 6-pollicaris usque pedalis, simplex, rariùs simpliciter furcatus, teretiusculus, crassitie pennæ corvinæ, pilis brevibus setosis puberulus, foliosus, constans internodiis 8—14; nodis inferioribus ex foliorum stipularumque lapsu nudis, earumque cicatricibus tantùm notandis. Folia 6—12, opposita, subæqualia, longiùs petiolata, ovata, basi acuta, apice acuminata, sesquipollicem



usque $2\frac{1}{2}$ pollices longa, lineas 8 usque pollicem lata; suprà in omni superficie, infrà in nervis venisque tantùm, pubescentia. Petioli lineas 6—9 longi, filiformes, imâ basi aliquantò dilatati, puberuli. Stipulæ interpetiolares foliaceæ, persistentes, lineas 3—5 longæ, latè ovatæ, supra basin dilatatæ, plerumque acutæ, lævigatæ. Umbella terminalis, 4—6-flora; pedunculo communi pollicari; involucro 4—6-phyllo; foliolis lanceolatis vel ovatis, lineas 2 circiter longis. Pedicelli semipollicares, subæquales, filiformes, hispidi. Calycis tubus turbinatus, pilis longioribus villoso-pubescens; limbus longitudine ferè tubi, 5-fidus, lobis ovatis. Corolla calyce multò major, glabra, æstivatione valvata; alabastro ovato; limbo patente, 5-fido, lobis ovato-lanceolatis, acutiusculis. Stamina 5; filamentis brevibus imo corollæ tubo affixis; antheris oblongis, bilocularibus, loculis rimâ longitudinali intùs dehiscentibus, cohærentibus in tubum conoïdeum stylum cingentem, corollæ tubum paulò superantem, apice in processus 5 membranaceos oblongos pariter cohærentes abeuntem. Pollen parvum, læve, subglobosum. Ovarium calyci omninò adhærens, biloculare; ovulis numerosissimis, placentæ carnosæ septo adnatæ affixis. Discus carnosus crassiusculus ovarium coronans. Stylus filiformis, longitudine antherarum. Stigma capitatum, vix exsertum, facilè, unà cum stylo, in duas partes longitudinaliter solubile. Capsula calycis limbo persistente et disco carnoso coronata, disco demùm in modum operculi secedente in apice depresso dehiscens, bilocularis. Semina numerosissima, parva, obovata, mutuâ pressione variè angulata, in loculo quovis placentæ pendulæ septo supernè adnatæ affixa.

The distinguishing characters of this remarkable genus of *Rubiaceæ* consist chiefly in its peculiar habit, the shortness of the tube of its corolla, the exsertion of its anthers, their connivence into a conical tube surrounding the style, and the dehiscence of the capsule at its apex, within the persistent limbus of the calyx, apparently consequent on the falling off of the thick fleshy disk by which it is surmounted. M. De Candolle has, in his "Prodromus," placed *Argostemma* in immediate apposition with *Ophiorhiza*, to which it certainly manifests considerable resemblance in several points of structure, and especially in habit, inflorescence excepted. But I am indebted to Mr. Brown for pointing out to me a much closer relation to *Hoffmannia*, which agrees with *Argostemma* in several of the characters above-noticed, such as the form of its corolla, its exserted stamina, connivent anthers, and not very dissimilar habit; while its technical differences appear to depend chiefly on the evident imbrication of the segments of its corolla, the smaller comparative size of its fleshy disk, its less evidently capitate stigma, and the angularity of its "capsula baccata," which, according to Swartz, is also "bivalvis." The stipulæ of *Hoffmannia*, it may be added, are small and caducous, and its infloresence consists of axillary cymes.

In *Argostemma* the connivence of the anthers is in most cases so complete as to lead to actual cohesion between them; but this is never, so far as I have observed, accompanied by organic connexion. The cohesion generally takes place within the flower-bud at an early period, and extends along the whole of the lateral faces of the anthers: ultimately, however, they become easily separable, especially in their sterile apices or beaks, which are sometimes prolonged to a length equal to that of the polliniferous cells, and frequently become distinct soon after the expansion of the flower. An imperfect observation in this state might give rise to the belief that they form so many hollow tubes opening by terminal pores, through which the pollen is discharged, as in *Solanum*, *Ericeæ* and *Melastomaceæ*; and it was doubtless a mistake of this kind, combined with a distant resemblance in habit, which led three several botanists to refer different species of *Argostemma* to the Melastomaceous genus *Sonerila*. But a closer examination shows that no pollen is produced in these prolongations, and that the polliniferous cells really dehisce by an internal fissure extending along their whole length. In one species, in which no prolongation of the anthers exists, no cohesion between them seems at any period to take place; and

in another, in which the prolongation is very short, the cohesion would appear to be at all times limited to the rudiments of these appendages, and to persist much beyond the usual period.

Four species of *Argostemma*, (of which three were from the mountains bounding the Indian Peninsula towards the north, and one from the high lands of Poulo Penang,) were known to Dr. Wallich in 1824, when he established the genus in the second volume of his Edition of Roxburgh's "Flora Indica." To these Dr. Blume added in 1830, in M. De Candolle's "Prodromus," four others, natives of the Mountains of Java. No other species, as far as I am aware, have since been characterized; but the magnificent collection presented by the Directors of the East India Company, through the intervention of Dr. Wallich, to the Linnean Society, contains three additional species from Southern India, Penang and Tavoy; and besides these I am acquainted with two unpublished species from Penang and one from Timor, in Mr. Brown's collection, and with six others from Java and Sumatra in that of Dr. Horsfield, making a total of twenty Asiatic species in this singular and little known genus. To these must still be added a minute species, the smallest of the genus, specimens of which, collected by Afzelius in Sierra Leone, are contained in the Banksian Herbarium, thus adding another to the list of Indian genera of which representatives are met with on the western coast of tropical Africa. Of the materials contained in these several collections, and brought together by Mr. Brown with a view to a monograph of the genus, he has kindly permitted me to make use, and I am thus enabled to offer the following *Synopsis Specierum.*

Flores terminales, umbellati vel umbellato-cymosi, rariùs solitarii.

1. *A. unifolium*, foliis 2 altero nano stipuliformi altero latè ovato cordato acuminato glabro, umbellâ longius pedunculatâ sæpius trifidâ multiflorâ, corollâ pentamerâ, antheris cohærentibus rostratis.

Hab. in Insulâ Penang, (*exam. s. in Herb. D. Brown ex Herb. Soc. Hort.*)

2. *A. humile*, foliis 2 altero nano stipuliformi altero lanceolato glabro, umbellâ simplici pauciflorâ, corollâ pentamerâ, antheris cohærentibus rostratis.

Sonerila (erecta? W. J.) *Herb. Ind. Soc. Linn.!* Rub. No. 231 (nec *Malay. Misc.* No. 2, p. 7.)

Argostemma, *Wall. ibid.*

Hab. in Insulâ Penang, (*exam. s. in Herb. Ind. Soc. Linn.*)

3. *A. pictum*, foliis 2 ovatis obtusis basi dilatatis subsessilibus altero sæpiùs duplo minore, umbellâ cymove longiùs pedunculato multifloro, corollâ pentamerâ, antheris apice cohærentibus brevissimè rostratis.

Argostemma pictum, *Wall.! in Roxb. Fl. Ind.* 2, p. 273.

Hab. in rupestribus Insulæ Penang, *Wallich* (*exam. s. in Herb. Ind. Soc. Linn., et in Herb. D. Brown ex Herb. Soc. Hort.*)

4. *A. Tavoyanum*, foliis 2 subæqualibus ovatis subcordatis glabris, stipulis magnis, umbellâ simplici hispidâ pauciflorâ.

Argostemma Tavoyanum, *Wall.! in Herb. Ind. Soc. Linn.* Rub. No. 224.

Hab. in Tavoy, *Wallich* (*exam. s. sine flore vel fructu, in Herb. Ind. Soc. Linn.*)

5. *A. verticillatum*, foliis plerumque 4 pseudo-verticillatis plùs minùs inæqualibus sessilibus oblongo-lanceolatis acuminatis glabris, umbellâ sæpius trifidâ multiflorâ, corollâ tetramerâ vel pentamerâ, antheris liberis erostratis.

Argostemma verticillatum, *Wall.! in Roxb. Fl. Ind.* 2. p. 325.

Argostemma acutum, *Wall.! in Herb. Ind. Soc. Linn.* Rub. No. 229.

Hab. in Napaliâ ad rupes Moreko, *Wallich (exam. s. in Herb. Ind. Soc. Linn., et in Herb. D. Brown.)*

Obs. Ab hâc specie vix differre videntur specimina Wallichiana e montibus Lahore in Herb. Ind. Soc. Linn. *Rub.* No. 230, nisi foliis plerumque senis vel etiam octonis, umbellâ simpliciore, floribus sæpiùs pentameris.

6. *A. inæquilaterum,* foliis plerumque 4 pseudo-verticillatis plùs minùs inæqualibus lanceolatis vel ovato-lanceolatis inæquilateris acuminatis glabris, umbellâ subsimplici paucifiorâ, floribus pentameris.

Hab. in Insulâ Penang, *(exam. s. fructiferum in Herb. D. Brown ex Herb. Soc. Hort.)*

7. *A. Timorense,* foliorum pari inferiore sæpiùs nano remoto ; 2 superioribus in pseudo-verticillum 4-folium approximatis inæqualibus ovatis vel ovato-oblongis basi acutis subsessilibus suprà glabris, floribus in pedunculis terminalibus sæpiùs binis subbifidis pentameris.

Hab. in Insulâ Timor in rupibus umbrosis humidiusculis, *R. Brown (exam. s. fructiferum in Herb. D. Brown.)*

8. *A. pumilum,* foliis subsenis approximatis inæqualibus ovalibus vel ovali-oblongis subsessilibus suprà pubescenti-villosis, umbellâ ferè sessili subtrifidâ paucifiorâ ; pedunculis lateralibus subsimplicibus, floribus pentameris.

Cortusoides, *Afzel.! in Herb. Banks.*

Hab. ad Sierra Leone, *Afzelius (v. s. fructiferum in Herb. Banks.)*

Obs. In altero specimine pedunculus terminalis solitarius 1-florus.

9. *A. rostratum,* foliis plerumque 6 pseudo-verticillatis subinæqualibus lanceolatis acuminatis glabris, umbellâ sæpiùs trifidâ paucifiorâ, corollâ pentamerâ, antheris cohærentibus : rostro longitudine loculorum.

Argostemma rostratum, *Wall.! in Roxb. Fl. Ind.* 2. p. 326.

Hab. in Monte Pundua, *Wallich (exam. s. in Herb. Ind. Soc. Linn.* Rub. No. 232.)

10. *A. sarmentosum,* foliis 4 pseudo-verticillatis latè ovatis obtusis subsessilibus hispidiusculis, umbellâ sub-4-florâ, corollâ tetramerâ (rariùs trimerâ), antheris laxè cohærentibus longiùs rostratis.

Argostemma sarmentosum, *Wall.! in Roxb. Fl. Ind.* 2. p. 324.

Argostemma obtusifolium, *Wall.! in Herb. Ind. Soc. Linn.* Rub. No. 223.

Sonerila squarrosa, *Don! Prodr. Fl. Nepal,* p. 155, (e specimine ex ipso Dom. Don. *D. R. Brown.)*

Sonerila angustifolia, *Wall.! List,* No. 4090.

Hab. in Kamoon, Gossains Thau, et Montibus Sylhet, *Wallich (exam. s. in Herbb. D. Brown et Ind. Soc. Linn.)*

11. *A. boragineum,* foliis pluribus subæqualibus ellipticis acuminatis utrinque puberulis petiolatis, umbellâ subtrifidâ multiflorâ, corollâ pentamerâ, antheris cohærentibus rostratis.

Argostemma boragineum, *Bl. in Dec. Prodr.* 4, p. 417.
Hab. in Insulâ Javâ, *Blume, Horsfield (exam. s. in Herb. Horsf.)*

12. *A. montanum*, foliis pluribus subæqualibus ovatis acuminatis utrinque puberulis petiolatis, umbellâ simplici 4—6-florâ, corollâ pentamerâ, antheris cohærentibus rostratis.
Argostemma montanum, *Bl. in Dec. Prodr.* 4. p. 418.
Hab. in Insulâ Javâ, *Blume, Horsfield (exam. s. in Herb. Horsf.)*

13. *A. pauciflorum*, " caule infernè repente supernè ramoso subscabro, foliis petiolatis ovatis acutis basi parùm attenuatis hirsutis, umbellâ pedunculatâ foliis breviore terminali subtrifidâ pauci-florâ." (*Dec.*)
Argostemma pauciflorum, *Bl. in Dec. Prodr.* 4. p. 418.
Hab. in Insulæ Javæ monte Salak, *Blume.*

14. *A. subinæquale*, foliis pluribus parùm inæqualibus ovatis acutis utrinque puberulis, umbellâ pauciflorâ, pedicellis brevibus, corollâ pentamerâ, antheris cohærentibus rostratis.
Hab. in Insulâ Sumatrâ, *Horsfield (exam. s. in Herb. Horsf.)*

15. *A. inæquale*, foliis pluribus ovatis basi rotundatis strigâ pallidâ longitudinali pictis : altero cujuscunque paris triplò minore, floribus binis vel raró solitariis, corollâ pentamerâ, antheris laxè cohærentibus breviter rostratis.
Hab. in Insulâ Sumatrâ, *Horsfield (exam. s. in Herb. Horsf.)*

16. *A. lævigatum*, caule pubescente, foliis pluribus altero cujuscunque paris nano stipuliformi altero lanceolato vel ovato-lanceolato basi inæquali rotundato (nisi infrà in nervo medio) glabro, stipulis ovatis, floribus solitariis vel binis, corollâ pentamerâ, antheris cohærentibus rostratis.
Hab. in Insulæ Javæ monte Karang, *Horsfield (exam. s. in Herb. Horsf.)*

17. *A. læve*, caule lævigato, foliis pluribus altero cujuscunque paris nano stipuliformi altero ovato-lanceolato basi apiceque acuto glabro, stipulis lanceolatis, floribus solitariis binis ternisve, corollâ pentamerâ, antheris cohærentibus rostratis.
Hab. in Insulâ Sumatrâ, *Horsfield (exam. s. in Herb. Horsf.)*

18. *A. uniflorum*, foliis pluribus altero cujuscunque paris nano stipuliformi altero elliptico vel elliptico-lanceolato basi inæquali apiceque acuto suprà lævigato subtùs ad nervum medium et in margine piloso, floribus solitariis, corollâ ciliatâ pentamerâ, antheris cohærentibus rostratis.
Argostemma uniflorum, *Bl. in Dec. Prodr.* 4. p. 418.
Hab. in Insulâ Javâ, *Blume, Horsfield (exam. s. in Herb. Horsf.)*

19. *A. parvifolium*, foliis plurimis altero cujuscunque paris nano stipuliformi altero elliptico acuto in margine venisque piloso, floribus solitariis, corollâ ciliatâ pentamerâ, antheris cohærentibus rostratis.
Hab. in Insulâ Sumatrâ, *Horsfield (exam. s. in Herb. Horsf.)*

** *Flores axillares, umbellati vel spicati.*

20. *A. longifolium*, foliis pluribus altero cujuscunque paris nano stipuliformi altero obovato-oblongo acuminato, umbellis paucifloris, corollâ pentamerâ, antheris cohærentibus rostratis.

Hab. in Insulâ Sumatrâ, *Horsfield* (*exam. s. in Herb. Horsf.*)

21. *A. calycinum*, foliis pluribus altero cujuscunque paris nano stipuliformi altero obovato-oblongo basi attenuato acuto, spicis multifloris, calyce corollam pentameram superante, antheris cohærentibus rostratis.

Argostemma? calycinum, *R. Br. in Herb. Ind. Soc. Linn.*, Rub. No. 233.

Hab. in Indiâ Orientali, apud Wynād, *Heyne* (*exam. s. in Herb. Ind. Soc. Linn.*)

Obs. Facies aliena ob flores spicatos et calycem corollam superantem, vera tamen *Argostemmatis* species et præcedenti arctè affinis.

The last species bears a close resemblance to the plant figured by Sir William Hooker* under the name of *Neurocalyx Zeylanicus*, which he and Dr. Arnott regard as "quite a new genus; certainly allied to, but very distinct from *Argostemma* of Wallich." The principal distinction would rest on the supposed "capsula 5-locularis" of *Neurocalyx*; but this character is admitted to be doubtful. In *Argostemma calycinum* the ovarium is certainly bilocular as in the rest of the genus. The spikes in the latter bear a smaller proportional length to the leaves than in Sir William Hooker's figure; and the stipulæ, instead of being laciniate, are ovate with long acuminate points. I cannot, however, but suspect that there is an intimate relation between the two.

The Javanese species of *Argostemma*, according to Dr. Horsfield's notes, "grow in a rich, black, vegetable mould, at an elevation of between 5000 and 7000 feet above the level of the ocean, in the dense forests which cover many of the mountains extending in an uninterrupted series from east to west through the island. As far as my observation goes," Dr. Horsfield adds, "the genus is most abundant in the western section of the island; but it does not occur to the notice of the traveller until he has ascended to the elevation above-mentioned."

I. J. B.

Tab. XXII. *Fig.* 1. *Argostemma montanum*, of the natural size. *Fig.* 2. An unopened flower. *Fig.* 3. An expanded flower, seen from above. *Fig.* 4. A portion of the flower magnified, with the calyx and two of the segments of the corolla removed. *Fig.* 5. The stamina, with the tube of the antheræ laid open, seen from within. *Fig.* 6. A single stamen, seen from without. *Fig.* 7. A flower, with the corolla and male organs removed. *Fig.* 8. A fruit, with the persistent limbus of the calyx, seen from above, of the natural size. *Fig.* 9. The same magnified, with one of the cells laid open. *Fig.* 10. A seed more highly magnified.

---

* *Icones Plantarum*, t. 174.

LERCHEA LONGICAUDA, *L.*

TAB. XXIII.

LERCHEA, *L. Mant. Pl.* p. 155.

CHAR. GEN. *Calyx* 5-dentatus. *Corolla* infundibuliformis, fauce barbata; limbo 5-fido, lobis æstivatione valvatis. *Antheræ* filamentis brevibus fauci affixæ, exsertæ. *Stylus* filiformis; *stigma* bipartitum, lobis linearibus conniventibus. *Discus* carnosus styli basin cingens per anthesin plùs minùs auctus (et dum plurimùm auctus cum medio tubo corollæ tunc urceolatæ et fauce imperviæ accretus; antheris tum etiam subsessilibus inclusis, stigmateque capitato obscurè bilobo). *Pericarpium* disco persistente coronatum, biloculare, bipartibile; coccis (indehiscentibus ?) polyspermis. *Semina* aptera.

Frutex *humilis*; foliis *pedalibus, obovato-oblongis, acuminatis, glabris*; stipulis *interpetiolaribus integris, persistentibus.* Spicæ *longissimæ filiformes.* Flores *parvi, in glomerulis subdistantibus per rachin sparsis.*

LERCHEA *longicauda,* L. Mant. Pl. p. 256.

Xanthophytum spicatum, *Bl. in Dec. Prodr.* iv. p. 413. quæ Chiococca spicata, *Bl. Bijdr.* p. 958 ?

DESCR.—Frutex bi- vel tri-pedalis. Ramuli cortice cinereo obducti, obsoletè angulati. Folia approximata, decussatim opposita, membranacea, obovato-oblonga, acuminata, basi in petiolum attenuata, 8-pollicaria usque pedalia, pollices 2—3 lata, utrinque glabra, subtùs pallidiora, integerrima, penninervia, nervis subtùs prominulis. Petiolus pollicaris, suprà canaliculatus, tomento brevissimo sordido densè vestitus. Stipulæ interpetiolares integræ, e latâ basi vaginante lanceolatæ setaceo-acuminatæ. Spicæ in axillis foliorum supremorum pedales vel ultrà, filiformes, ad basin bracteis quibusdam foliorum stipulis subsimilibus instructæ. Rachis angulato-sulcata, tomento brevissimo vestita. Flores parvi, in glomerulis (spicis abbreviatis) numerosis, paucifloris, secùs rachin digesti. Pedicelli brevissimi, cum calycibus turbinatis similiter ac rachis petiolique



tomentosi. Calyx omninò adhærens, nisi in limbo 5-dentato; dentibus membranaceis ovato-trigonis. Corolla glabra, infundibuliformis, limbo 5-fido; lobis parùm patentibus, in æstivatione valvatis, ovatis, acutis, tubo triplò brevioribus; fauce pilis erectis appressis sericeis densè barbatâ. Stamina 5; filamenta brevia, vix longitudine antherarum, fauci corollæ barbatæ inserta; antheræ parum e tubo corollæ exsertæ, medio dorso affixæ, ovales, biloculares; loculis infernè discretis, basi barbatis, apice obscurè penicillatis. Pollen minutum, læve, subsphæricum. Ovarium biloculare; placentis duabus carnosis, septo adnatis, polyspermis. Ovula minuta, undique versa. Discus carnosus subcylindricus vel sæpè turbinatus, styli basin cingens, per anthesin plùs minùs auctus. Stylus longitudine tubi corollæ, ultra discum filiformis, crassiusculus, desinens in stigma bilobum; lobis linearibus, undique papillosis, erectis, conniventibus, altero quandoque paulo majore. Pericarpium subglobosum, disco carnoso calycisque dentibus emarcidis coronatum, biloculare, bipartibile; coccis intùs cartilagineis, verosimiliter indehiscentibus. Semina plurima, minuta, mutuâ pressione subangulata; testâ castaneâ, fragili, impresso-punctatâ; membranâ internâ tenuissimâ, pellucidâ. Albumen oleosum, copiosum. Embryo parvus, ovatus; radiculâ hilo proximâ, obtusâ; cotyledonibus brevibus, plano-convexis.

Obs. Corollæ tubus sæpè per anthesin carnoso-incrassatus, infernè ampliatus, supernè ad faucem contractus, cum stylo agglutinatus, et impervius. Discus carnosus tunc plerumque magis auctus, cum stylo et quandoque etiam cum medio tubo corollæ incrassato accretus. In floribus talibus, cum floribus structuræ normalis mixtis, antheræ plerumque subsessiles, inclusæ; stigma peltato-capitatum, obscurè bilobum, vix papillosum. An hic latet *Polygamia?* Ovula tamen verosimiliter æquè cum aliis evoluta.

The recovery of a lost Linnean genus after the lapse of more than sixty years is in itself a circumstance of no trifling gratification; but the pleasure is in the present instance much enhanced by the remarkable structure of the plant, which is so singular as to have widely misled Linnæus with regard to its classification in his system. Notwithstanding this misplacement (which is capable of easy explanation), and some other errors in the Linnean description, Mr. Brown, on seeing the present plant in Dr. Horsfield's collection, at once suspected its identity with *Lerchea longicauda*, and a closer examination convinced him that his suspicion was correct; but no specimen of the plant was found in its proper place in the Linnean Herbarium, nor was any indication given by Linnæus of the source from which his description was derived. A comparison with the original materials seemed therefore to be hopeless, and it was not until very recently that, in turning over the parcels of unarranged plants forming part of the Linnean collection, Mr. Brown met with two several specimens of the plant, the one unnamed, but with the words "Sambong" and "Langoe" written beneath it in the hand of Linnæus; the other marked with the generic name "*Codaria*," and with a MS. generic character by Linnæus on the back of the page, expressed in the following terms. "*Cal. Per. tubulosum 1-phyllum 5-dentat. persistens. Cor. infund. erecta: tubo calyce duplò longiore. Limbus erectus 5-partitus, faux villosa. Stam. 5. Filamenta nulla. Antheræ oblongæ sessiles sub faucis lanâ. Pist. Germen subinferum umbilicatum. Stylus filiformis, longit. stam. Stigm. 2 obtusiuscula. Caps. subglobosa 3-sulca 3-locularis. Sem. plurima.*"

The MS. characters here given by Linnæus apply with the greatest accuracy to the plant. Compared with the preceding description they will be found to differ only in the "*Germen subinferum*" and "*Caps. 3-sulca 3-locularis;*" but the first finds a ready explanation in the large size of the fleshy disk surmounting the inferior ovary; and the second is an occasional variation, which, in conjunction with a 3-lobed stigma, has also been observed by Mr. Brown in Dr. Horsfield's specimens; it seems, however, to be of rare occurrence.

Linnæus appears, however, not to have been satisfied with either the name or the characters which he had first given to the plant, for in his "Mantissa altera" he changed the former into *Lerchea*, and modified the latter as follows: "CAL. *Perianthium* monophyllum, tubulosum, quinquedentatum, persistens. COR. monopetala, infundibuliformis: *Tubus* calyce longior. *Limbus* quinquepartitus, erectiusculus. STAM. *Filamenta* vix ulla, sed tubus germinis. *Antheræ* quinque, oblongæ, sessiles. PIST. *Germen* subovatum, superum, terminatum (intra corollam) tubo obtuso. *Stylus* intra tubum germinis, filiformis, longitudine staminum. *Stigmata* 2 s. 3, obtusiuscula. PER. *Capsula* subglobosa, torulosa, trilocularis (interdùm bilocularis). SEM. plurima." In this character it will be perceived that, although even the words of that previously given to *Codaria* are adopted in some cases, modifications have been made in others, rarely for the better, but capable of explanation on the supposition that Linnæus had in the mean time imperfectly examined some flowers in the anomalous condition noticed in the observation appended to the foregoing description. Thus, the "filamenta vix ulla, sed tubus germinis," and "germen superum, terminatum (intra corollam) tubo obtuso," seem to depend partly on the previous mistake of the disk for the germen, and partly on the additional error of regarding the thickening within the upper part of the tube of the corolla as a prolongation of the disk (in these flowers) cohering with it. On this supposition he was easily led to consider the anthers as attached to what he calls the "tubus germinis," and consequently to regard them as monadelphous, in which class he therefore placed the genus. On the other hand, he corrects his previous character by making the number of parts observed in the stigma and capsule the same, although he erroneously regards three as the rule instead of the exception. No manuscript description of *Lerchea* appears to exist in Linnæus's interleaved copies of the "Species Plantarum" and other works accompanying his Herbarium; but not a doubt can exist of the correctness of Mr. Brown's determination of the plants in that collection to which the name belongs, and they are in every respect identical with Dr. Horsfield's specimens now figured and described.

The genus *Lerchea*, thus defined by Linnæus, has been adopted from him by most systematic writers, with the terms of its character variously modified. Schreber, Jussieu, Lamarck, Persoon, Willdenow, and Sprengel have admitted it into their respective works; but it seems at present on the point of being abandoned, some later writers, probably not satisfied of its actual existence in nature, in consequence of its not having been again observed, having expunged it from their catalogues. Thus it is no longer to be found in the useful lists of genera published by Dr. Bartling and by Professor Lindley. Its true place in the natural system has not even been suspected, and the only suggestion on the subject is that made by Jussieu*, who inquires "an Convolvulis, an Lysimachiis affinis?" To this question he was doubtless led by Linnæus's erroneous character of "germen superum;" for he was not then prepared to admit, as he afterwards did†, a genus possessing that character among his *Rubiaceæ*, nor was it then understood how very nearly related to that family are many genera furnished with a free ovarium‡. The genus *Baconia* of M. De Candolle affords an instance of a mistake similar to that of Linnæus, in which a large epigynous disk was originally described as an "ovarium liberum apice umbilicatum§," since modified by the learned Professor into "discus crassus ovarium coronans et in flore ovarium liberum mentiens‖."

The most remarkable peculiarity in the structure of *Lerchea* consists in the large size and occasional cohesions of its epigynous disk. This disk, which in the early stage forms merely a thickened fleshy ring surrounding the base of the style, and free from any adhesion to the corolla, gradually enlarges in most cases so as completely to fill the lower half of the tube of the corolla, with the thickened and narrowed part of which it at length occasionally coheres below the point of insertion of the anthers, and even sometimes becomes adherent with the latter at

* *Genera Plantarum*, p. 421. † *Annales du Muséum*, x. p. 325, & *Mémoires du Muséum*, vi. p. 404.

‡ See Mr. Brown's Observations in Tuckey's Narrative, p. 448—9.

§ *Annales du Muséum*, ix. p. 219. ‖ *Prodromus*, iv. p. 485.

their base, as well as with that portion of the style which it surrounds. More commonly these adhesions do not take place; and the fleshy disk is sometimes little or not at all developed beyond its original size. When the corolla falls off, the disk remains adherent to the ovarium, and continues visible on its summit until the fruit has arrived at maturity. A similar disk is generally present in the order, but usually in a rudimentary state; it frequently, however, becomes sufficiently obvious to have been introduced by various writers, and especially by Dr. Blume, into the generic character, but I am aware of no other instance in which it acquires so large a relative size, or contracts an occasional adhesion with the tube of the corolla.

The place of *Lerchea* is evidently in M. De Candolle's subtribe of *Rondeletieæ*, approaching to that Asiatic form which Dr. Bartling has distinguished under the name of *Wendlandia*. But the differences between the two genera are many and obvious; such as the imbricated æstivation of the corolla in *Wendlandia*, its patent and generally revolute limbus, exserted anthers, dilated stigmata, rudimentary disk, dehiscent capsule, and panicled inflorescence. In its indehiscent bipartible capsule and more evident disk, *Xanthophytum* of Professor Reinwardt seems to occupy an intermediate station, and to be the nearest approach to *Lerchea* that has yet been described; but with the exception of these points, the original species, *Xanthophytum fruticulosum*, appears to differ in the same particulars as *Wendlandia*. I am, however, strongly inclined to believe that Dr. Blume's *Xanthophytum spicatum*, originally referred by him to *Chiococca*, is identical with the Linnean *Lerchea longicauda*. There is nothing in the character and short description of that species, given in M. De Candolle's "Prodromus," at variance with this presumption, except the phrase "stipulæ utrinque *binæ*;" whereas in *Lerchea*, as in most *Rondeletieæ*, the stipulæ are so intimately united as to be properly described as "utrinque solitariæ v. integræ."

Dr. Horsfield has noted of *Lerchea longicauda*, that he "found it first, in 1809, in the district of Pajittan, at an elevation of about 1000 feet above the level of the ocean, on a range of hills near the south coast, in a rich black soil; and subsequently, but once, near Buitenzorg, about fifty miles from Batavia, at the same elevation, and in a similar soil. It is a small undershrub, between two and three feet in height." The locality appended to one of the Linnean specimens is, "Sambong," a place in the island of Java, at no great distance westward from Cheribon. In his "Mantissa" Linnæus gives the habitat under the general and comprehensive form of *India Orientalis*, which, as in the case of *Dialium Indum*, *Saraca Indica*, and other plants described for the first time in that work, includes Java, and even the more distant islands. I. J. B.

Tab. XXIII. *Fig.* 1. A branch of *Lerchea longicauda*, of the natural size. *Fig.* 2. A flower, magnified. *Fig.* 3. The corolla laid open. *Fig.* 4. One of the stamina, seen from within. *Fig.* 5. The same, seen from without. *Fig.* 6. A flower, after the removal of the corolla, more magnified, showing the disk in its original state. *Fig.* 7. A transverse section of the ovarium. *Fig.* 8. A ripe fruit, with one of the persistent teeth of the calyx turned back, to show the persistent disk. *Fig.* 9. A transverse section of the same. *Fig.* 10. A seed, highly magnified. *Fig.* 11. The embryo.

LOXOTIS OBLIQUA.

TAB. XXIV.

CHAR. GEN. *Calyx* tubulosus, 5-fidus, æstivatione valvata. *Corollæ personatæ labium superius* abbreviatum, bilobum; *inferius* productum, semitrilobum (lobis lateralibus nanis). *Stamina* inclusa; *antherifera* duo, antheris reniformibus. *Stigma* capitatum (vix divisum). *Capsula* subovata, calyce inclusa, bivalvis; *placentis* utrinque seminiferis.

Herba *alternifolia, annua, erecta, glabriuscula.* Caule *succulento.* Foliis *integerrimis, basi hinc altè excisis.* Racemis *subsecundis, indivisis, pedicellis solitariis, unibracteatis, floribus deflexo-porrectis, cæruleis.*

Obs. Genus ad tribum Cyrtandracearum pertinens, proximum Glossantho, quæ, foliis et inflorescentia omnino conveniens, vix aliter differt nisi staminibus quatuor antheriferis antheris in coronulam cohærentibus, calyce basi inæquali angulisque tubi altius alatis, labio corollæ inferiore indiviso et disco hypogyno completo.

LOXOTIS OBLIQUA.

α. Calycis laciniæ acutiusculæ tubo breviores.

Antonia vel Loxotis. *R. B. in Wallich, Pl. Asiat. Rar. vol.* iii. *p.* 65. in obs. sub Aikinia.

Loxotis obliqua. *Benth. Scrophul. Ind. p.* 57.

Wulfenia obliqua. *Wallich, Tent. Flor. Nepal. p.* 45. *t.* 35. *Don, Flor. Nepal. Prodr. p.* 92.

Rhinchoglossum obliquum. *Blume, Bijdr. Stuk.* 14. *p.* 741.?

β. Calycis laciniæ acutissimæ tubo longiores.

Loxotis intermedia. *Benth. Scrophul. Ind. p.* 57.

Wulfenia intermedia. *Wallich, Cat. n.* 408?

DESCR. Herba annua, erecta, glabriuscula, pube brevi articulata acuta rara conspersa. *Radix* fibrosa. *Caulis* teres, succulentus, crassitie pennæ anserinæ, 3—12-uncialis, modo simplicissimus sæpius parum ramosus, ramis ad ortum cum ipsa basi petiolorum confluentibus sæpe

Tab. XXVI.



LOXOTIS OBLIQUA.

duobus v. tribus seriatis, inferiore (cauli proximo) præcociore. *Folia* alterna, petiolata, exstipulata, integerrima, membranacea, lætè viridia, circumscriptione subovata cum acumine brevi, inæquilatera, basi hinc altè et ad nervum usque excisa inde rotundata, venis primariis vix eminentibus costata, venulis immersis, ultimis obsoletis, utrinque pube in adultis rarissima instructa, quandoque glaberrima, $2\frac{1}{2}$ usque 4 pollices longa. *Petioli* antice canaliculati 1—$1\frac{1}{2}$ unciales. *Racemi* terminales et axillares, simplicissimi, secundi, 2—4-unciales, rari, basiflori, pedicellis alternis recurvis unifloris unibracteatis. *Bracteolæ* vel subtendentes vel ipso pedicello insidentes, angustissimè lineares subfiliformes, erectæ, virides, pedicellis breviores. *Flores* deflexo-porrecti, cærulei. *Calyx* liber, tubulosus, 5-gonus, viridis, subbilinearis, æqualis, persistens; *tubi* lateribus planis, angulis in aciem alamve angustissimam exstantibus, minutè denticulatis, basi obtusa æquali; *limbi laciniis* semilanceolatis acutis sæpius acutiusculis tantum, æstivatione valvata alabastro acuto. *Corolla* monopetala, lætè cærulea, glaberrima, personata; *tubus* calyce longior subcylindraceus: *faux* clausa arcu elevato transverso tenuissimè pubescenti ad basin utriusque labii, inferioris stria verticali brevi in areas duas pro receptione antherarum distincto: *limbus* bilabiatus: *labium superius* brevius, bifidum, respectu axeos racemi adscendens, lobis obtusis sinu rotundato; *labium inferius* lingulatum, cæruleum basi macula flava insignitum, apice semitrifido lobulis obtusis, lateralibus nanis. *Stamina antherifera* duo inclusa; *filamentis* sinubus lateralibus labii inferioris suboppositis, compressis, adscendentibus, glabris: *antheris* reniformibus, imberbibus, conniventibus leviterque cohærentibus, violaceis, bilocularibus, loculis basi divaricatis apice confluentibus, utriusque valvula interiore breviore et angustiore: *pollen* brevè ovale, obtusè trigonum. *Filamenta sterilia* tria, quorum *duo* sinubus interlabialibus respondentia, apicibus simplicibus acutiusculis: *tertium* nanum axi labii superioris oppositum. *Ovarium* liberum, sessile, ovatum, compressum, glabrum, viride, utrinque sulco longitudinali axi placentæ lateralis respondenti insculptum, uniloculare, polyspermum: *placentis* duabus parietalibus, lateralibus, e lamina angusta ortis, bilobis, lobis planis, utrinque et per totam ferè superficiem ovuliferis. *Stylus* filiformis glaber pallidus, situ et longitudine staminum antheriferorum, diu persistens. *Stigma* depresso-capitatum indivisum papulosum stylo manifestè crassius. *Vaginula* hypogyna incompleta, venoso-striata, glaberrima, subtruncata sæpè lobata. *Capsula* deflexa, calyce persistenti arctè cincta ejusque longitudine, ovata, compressa, utrinque sulco longitudinali insculpta, unilocularis, bivalvis. *Placentæ* parietales duæ, axibus valvularum lamina angusta in lamellas duas fissili adnatæ, bilobæ, lobis expansis utrinque seminiferis. *Semina* undique versa, parva, numerosissima, elliptico-oblonga utrinque acuta, basi funiculo brevi crassiusculo pallido affixa; *testa* crassiusculo-membranacea; *membrana interna* obsoleta. *Embryo* exalbuminosus, aqueo-pallidus, cavitatem testæ replens, rectus; *cotyledones* breves; *radicula* teretiuscula umbilicum attingens.

I observed the plant here described and figured in the Island of Timor near Coepang, chiefly in shady places, but sometimes in more exposed situations, in April, 1803. The same species was several years after collected in many parts of Java by Dr. Horsfield, who states that it grows "in shaded situations at no great elevation above the ocean, near rivulets and ponds, rarely in forests; and that the native name is *Turu-pencheng*." If I am correct in referring *Rhinchoglossum obliquum* to our plant, it was observed also by Dr. Blume in mountainous situations of the same island, flowering in February.

By Dr. Wallich it was found in Nepal, Sylhet, and also in Martaban; for although he has considered the plant

from the last-mentioned region as a different species, named *intermedia* in his list, and for which Mr. Bentham has proposed a specific difference, yet I find that the greater number of specimens collected in Nepal in 1819, and sent by Dr. Wallich to Sir Joseph Banks in the following year, have the deeply divided calyx with very acute and narrow segments characteristic of *L. intermedia,* while among the specimens from Martaban, in Dr. Wallich's Indian Herbarium, in the Museum of the Linnean Society, both states of calyx occur. But though I am not disposed to regard these differences in calyx as of specific importance, it is right to state that all the specimens which I have examined from Java and Timor, as well as those from Jurreepanee in the collection of Dr. Royle, agree in having the broader less acute and shorter segments of calyx, as represented in Mr. Bauer's figure, and also in that of Dr. Wallich.

With respect to the generic name *Loxotis* here adopted, it is that which I first gave in my manuscripts to the plant now described. This, however, I many years ago changed to *Antonia,* in compliance with the request of my lamented friend and fellow-traveller Mr. Ferdinand Bauer, to whom I was indebted for the figure here published. But as that name, by which it was introduced into a celebrated flower piece, painted in honour of the late Baron Jacquin at Vienna, and well known to the botanists of that capital, was never otherwise made public; and as Antonia of Pohl since published in his work on the "Plants of Brazil (vol. ii. p. 13. tab. 109.)" is sufficiently established as a genus; I have been obliged to recur to my original name, under which indeed it has already appeared in Mr. Bentham's "Essay on Scrophularinæ Indicæ." The name *Loxotis,* however, may now be objected to from its too close resemblance in sound and identity of meaning, to *Loxonia,* another genus of the same family, more recently established by Dr. Jack; and the specific name *obliqua* is hardly less exceptionable, being merely a translation of that of the genus. This difficulty would be easily removed were it absolutely certain that *Rhinchoglossum* of Dr. Blume was identical with *Loxotis;* but from some of the characters ascribed to it I am not entirely satisfied that such is the case; and, indeed, as it is arranged by its author with *Rhinantheæ,* had I not remarked that it had been referred with a doubt to *Cyrtandraceæ* by Professor Lindley, in his enumeration of the genera belonging to that family, I should probably have overlooked it altogether, as I had previously done with respect to *Epithema* of Blume, which the author included in *Primulaceæ,* though unquestionably the same genus with my *Aikinia,* also belonging to *Cyrtandraceæ.*

With regard to the genus itself, it may be doubted whether *Loxotis* and *Glossanthus* ought to be generically distinguished merely or chiefly on account of the difference in the number of their antheriferous stamina, especially as they entirely agree in habit, in which there is something peculiar. It is not a little remarkable, that in some of the more minute and less important differences between them, the intermediate structure or connecting link should be found in a species sent by Dr. Schiede from Mexico (*Glossanthus Mexicana,* Br. ined.), and that this should be the only plant belonging to *Cyrtandraceæ* hitherto observed in any part of America.

R. Br.

Tab. XXIV. *Fig.* 1. *Loxotis obliqua,* natural size. *Fig.* 2. A front view of a flower, slightly magnified. *Fig.* 3. An opposite view of corolla only. *Fig.* 4. Corolla laid open, showing the antheriferous and the two lateral barren stamina (the minute rudiments of the 5th omitted). *Fig.* 5. Calyx, after the falling of corolla, with the persistent style and stigma. *Fig.* 6. An antheriferous stamen. *Fig.* 7. Pistillum separate and magnified (the hypogynous incomplete disk wanting). *Fig.* 8. Upper part of style with the slightly and unequally bi-lobed stigma. *Fig.* 9. Capsule with its persistent style, natural size. *Fig.* 10. The same magnified. *Fig.* 11. Capsule after bursting, showing the form of one of the parietal placentæ. *Fig.* 12. A placenta separate. *Fig.* 13. A transverse section of a capsule, showing the origin of the placenta and insertion of seeds on both surfaces. *Fig.* 14. A valve of the capsule with its placenta, from which the seeds have been removed. *Fig.* 15. A side view of the same. *Fig.* 16. A seed, with its testa. *Fig.* 17. A seed, deprived of its testa. *Fig.* 18. The embryo.



LOXONIA ACUMINATA.

LOXONIA ACUMINATA.

TAB. XXV.

Loxonia, *Jack in Linn. Trans.*, xiv. p. 40.

Char. Gen. *Calyx* 5-partitus æqualis, æstivatione valvata. *Corolla* bilabiata: *fauce* aperta: *labio superiore* semibifido; *inferiore* trifido. *Stamina antherifera* 4, didynama, exserta; *antheris* reniformibus, per paria approximatis. *Stigma* bilobum, obtusum. *Capsula* ovata, calyce persistente longiore cincta, bivalvis; *placentis* utrinque seminiferis.

Herbæ *v.* Suffrutices. Folia *opposita, inæqualia: majore inæquilatere, dentato; altero nano, integerrimo, stipuliformi.* Racemi *subcymosi, recurvi, sæpè bifidi, ex alis foliorum stipuliformium.*

Obs. Genus Cyrtandracearum a b. Jack conditum et ad eandem sectionem cum *Loxoti* referendum, sed affinitate arctius junctum cum *Staurantherâ* in quâ folia opposita nec alterna, pari modo inæqualia, altero nempe nano stipuliformi; altero inæquilatere.

Loxonia *acuminata*, pubescens, foliis lanceolato-oblongis acuminatis denticulatis; nanis reniformibus, racemis subbifidis folio brevioribus.

Descr. Suffrutex parcè tenuissimèque pubescens. Caulis erectus vel adscendens, ramis teretibus parum flexuosis, pube subappressa. Folia opposita, quorum alterum lanceolato-oblongum acuminatum inæquilaterum, denticulis brevissimis, subsessile, ni fallor aversum, basi hinc (lateris inferioris) obtusâ rotundatâ, superioris et angustioris excisâ, costatum, venis primariis alternis arcuatis intra marginem deliquescentibus anastomosantibus, secundariis tertiariisque divaricatissimis, ultimis reticulantibus immersis, 5—8 pollices longum $2\frac{1}{2}$—3 pollices latum, membranaceum, viride, subtus pallidius, in cujus alâ rudimentum minutum gemmæ foliaceæ: alterum nanum stipuliforme sessile reniforme latius quam longum integerrimum, e cujus alâ pedunculus folio majore brevior, nano ipso multotiès longior. Racemus subbifidus, ramis 3—5-floris, bracteis subulatis. *Calyx* 5-partitus: *laciniæ* lanceolatæ acuminatæ herbaceæ pilosæ pilis crebris articulatis acutis patulis, longitudine æquales, duæ laterales superiorum paulùm angustiores, trinerviæ, æstivatione valvatâ alabastro ovato acuminato, acuminum apicibus distinctis. *Corolla* monopetala bilabiata, calyce parùm lon-

gior, glabra; *tubo* ventricoso calyce breviore; *fauce* apertâ infernè barbatâ; *labio superiore* semi-bifido plano, lobis obtusis; *inferiore* profundè trifido, lobis obtusiusculis integerrimis, medio paulò longiore. *Stamina antherifera* quatuor didynama exserta limbo tamen breviora. *Filamenta* subulata conniventia glabra, duo inferiora longiora. *Antheræ* conformes per paria approximatæ et leviter cohærentes, imberbes, reniformes, loculis divaricatis apice confluentibus medio anticè longitudinalitèr dehiscentibus. *Pollen* subglobosum. Rudimentum staminis quinti brevissimum absque antheræ simulacro. *Ovarium* liberum sessile ovatum glaberrimum disco annulari angustissimo imberbi basi cinctum, uniloculare, placentis duabus parietalibus bifidis lobis divaricatissimis planis utrinque ovuliferis. *Stylus* cylindraceus glaber longitudine circiter staminum. *Stigma* obtusum papulosum obsoletè bilobum stylo parùm crassius. *Capsula* ovata cuspidata membranacea calyce persistenti brevior unilocularis bivalvis, cuspide bipartibili; valvulæ medio placentiferæ; placenta singula utrinque dilatata in laminam rectam marginibus utrinque seminiferis. *Semina* numerosissima minuta obovata sessilia, sæpè angulata mutuâ pressione, castanea: testa membranacea tenax: membrana interna tenuissima albumini parco v. parcissimo adhærens. *Embryo* rectus aqueo-pallidus subovatus, cotyledonibus brevissimis.

I have considered the plant here figured as distinct from *Loxonia hirsuta* of Jack, which, however, it appears from his description to resemble in so many points that it may actually belong to the same species, differing only somewhat in the form of the leaves and in being less pubescent. Dr. Jack did not find his plant in fruit, neither did he ascertain the dehiscence of the capsule in *L. discolor*, from which the character of the genus was formed. In both species he describes the ovarium as bilocular, and the lobes of the placentæ as revolute.

Dr. Horsfield found this plant in 1818, when he accompanied Sir Stamford Raffles on his journey from Padang—one of the principal stations on the west coast of Sumatra—to the Menangaboo country, growing on the ranges of hills which extend parallel to the coast from N.W. to S.E., in shaded forests between 500 and 1000 feet above the level of the ocean. He did not observe it in Java.

Tab. XXV. *Fig.* 1. *Loxonia acuminata*, natural size. *Fig.* 2. A flower, magnified. *Fig.* 3. An anthera, with a portion of the filament. *Fig.* 4. Style and stigma. *Fig.* 5. Capsule surrounded by the calyx. *Fig.* 6. Capsule after dehiscence, the calyx being removed. *Fig.* 7. One of the valves of the capsule. *Fig.* 8. Transverse section of the ripe capsule. *Fig.* 9. A seed. *Fig.* 10. The embryo.

Cyrtandraceæ, to which *Loxonia* and *Loxotis* belong, was established in 1822* by the late Dr. Jack as a natural order, according to him most nearly allied to *Bignoniaceæ*, but differing sufficiently from that family in the structure of its fruit, especially in the placentation of its minute seeds.

The existence or absence of albumen in the ripe seed is not expressly stated in his character of the order, nor is it noticed in the description of any of the species he has referred to it. It may, however, be presumed that he believed the whole family to agree in this respect with *Bignoniaceæ*, next to which he had placed it; and he had at least the proof of the absence of albumen in Roxburgh's figure of his *Incarvillea parasitica*, in which the structure of ovarium as well as of seeds is correctly given.

The genera referred by Dr. Jack to this new family are *Cyrtandra* of Forster, *Didymocarpus* of Wallich, and

* Linn. Soc. Transact. vol. xiv. p. 23.

two other genera for the first time proposed, namely, *Æschynanthus*, to which Roxburgh's *Incarvillea parasitica* belongs, and *Loxonia*.

Nearly about the same time Mr. Don published his *Didymocarpeæ* *, a family consisting of two of Dr. Jack's *Cyrtandraceæ*, namely, *Didymocarpus* and *Æschynanthus* (his *Trichosporum*), and a new genus *Lysionotus*. He in like manner depends chiefly on placentation, which is not very clearly described; and he also introduces into his character the absence of albumen, the pendulous position of seeds, and the undivided stigma. From this family he excludes *Cyrtandra*, which has, he states, erroneously however, a copious albumen; while *Chirita* of Dr. (Buchanan) Hamilton, of which Dr. Jack's *Didymocarpus* includes at least one species, is doubtfully referred to *Scrophularinæ*, chiefly on account of its bilamellar stigma.

In 1826 Dr. Blume † refers *Cyrtandraceæ* to the natural order *Bignoniaceæ*, distinguishing it as a tribe from true *Bignoniaceæ* by its pendulous seeds, and subdividing it into two sections: the first, *Trichosporæ*, with capsular fruit, and seeds either winged or with some other form of appendage; the second, *Cyrtandreæ*, having baccate fruit and seeds without appendage. To each of these sections he has added more than one new genus, but *Loxotis* and *Loxonia* are not included in either of them; though *Loxotis*, as I have already stated, is probably his *Rhinchoglossum*, referred by him to *Rhinantheæ*; and *Loxonia*, notwithstanding his account of the fruit, may possibly be his *Loxophyllum*, which he has placed in *Scrophularinæ*; while his *Epithema*, my *Aikinia*, also belonging to *Cyrtandraceæ*, he refers to *Primulaceæ*.

It is somewhat remarkable that none of these writers should have adverted to the affinity of this new family to *Besleriaceæ* of Richard and De Jussieu, now generally named *Gesneriaceæ*. This affinity, however, did not escape Dr. Von Martius, who in his elaborate account of *Gesneriaceæ*, published in 1829 ‡, considers *Cyrtandraceæ* as sufficiently distinct from that order in the absence of albumen and in having an inverted embryo: the latter character he states on the authority of Mr. Don, who, in employing the term "Embryo inversus," can only have intended to express its direction with respect to pericarpium; such at least is the real structure of those genera which he referred to his *Didymocarpeæ*, and it is certain that in the relation of embryo to hilum both families entirely agree.

Dr. Von Martius also notices the difference in the order of abortion of stamina between these two families, which is no doubt generally true, but admits in each of at least one exception; *Sarmienta* in *Gesneriaceæ*, agreeing with *Cyrtandraceæ* in having only its two anterior or lower stamina antheriferous; and in this latter family *Aikinia* or *Epithema*, which, as in the greater part of diandrous *Gesneriaceæ*, has its two posterior or upper stamina perfect.

There is indeed another, and that a very remarkable, distinction noticed in the position of the lobes of the stigma, which in *Gesneriaceæ*, according to Von Martius, are placed right and left in relation to the parts of the flower, and consequently opposite to the lateral parietal placentæ; while in *Cyrtandraceæ* the lips of the stigma,—for so it is necessary to express the fact in this family,—are anterior and posterior, and therefore alternate with the lateral placentæ; the latter being the ordinary relation in unilocular ovaria, where the placentæ and lobes, or rather lips, of stigma correspond in number. This difference, however, even were it fully established, would hardly be available here as a technical distinction, several genera in each family having an undivided stigma; unless in such cases the position of the confluent parts could be determined by that of the two vascular cords generally observable in the style, and continued into the axes of the lobes of a regularly bifid stigma, when belonging to an ovarium composed of two carpels. But even if this distinguishing character should be admitted to be general, it is certainly not without exception; and in the only cases that I have examined in *Gesneriaceæ*, where the lateral position of the lobes of stigma may be supposed to exist, the apparent position arises from the extreme breadth and manifest division of the lips, the two vascular cords of the style being still anterior and posterior §.

* Edinburgh Philosophical Journal, vii. p. 83., and *Prodromus Floræ Nepalensis*, p. 121.

† *Bijdragen*, p. 759.

‡ *Nov. Gen. Pl. Bras.* iii. p. 72.

§ To estimate correctly the importance of the relation between the divisions of the stigma and the parietal placentæ of the

The only point of difference remaining, therefore, is the existence of albumen in *Gesneriaceæ* and its absence in *Cyrtandraceæ*. This character however is not absolutely constant, there being cases in *Cyrtandraceæ*

compound ovarium, namely, whether when agreeing in number they are placed opposite to or alternate with each other, it is necessary to take into consideration the theoretical view which appears the most probable of the origin or formation of a simple ovarium, and that of the stigma belonging to it, as well as the various kinds and degrees of confluence by which the real nature of both organs, but especially the latter, is so often obscured.

It is at present, I believe, universally agreed to consider a polyspermous legumen as that state of the simple ovarium, which best exemplifies the hypothetical view of the formation of this organ generally adopted; namely, that it consists of the modification of a leaf folded inwards and united by its margins, which in most cases are the only parts of the organ producing ovula; or, at least, where this power of production is not absolutely confined to the margins, it generally commences with or includes them.

The exceptions to the structure as here stated are of two kinds:—

First. Where the whole internal surface of the carpel is equally ovuliferous, which is the case in a few families of very small extent, as Butomeæ, Nymphæaceæ and Lardizabaleæ.

Secondly. Where the production of ovula is limited to the external angle of the cell or axis of the leaf supposed to form the carpel.

A case of this kind is found in a portion of one of those families in which the whole surface is generally ovuliferous, namely, in Hydropeltideæ, which I have always regarded as merely a section of Nymphæaceæ*; and from the nature of these differences in placentation, which are more apparent than real, an argument might even be adduced in favour of that opinion.

A placenta apparently limited to the outer angle of the cell also occurs in the greater number of species of Mesembryanthemum. As this structure, however, is certainly not without exception in that very natural genus, several species, among which are Mesembryanthemum crystallinum, cordifolium, papulosum and nodiflorum, having the placenta confined to the internal angle of the cell or margins of the carpel; and as in some of those species in which the outer angle is placentiferous, the production of ovula is not confined to it, but extends to the lower half of the inner angle;—this apparent deviation from ordinary structure may perhaps be explained by assuming cohesion of the inflected portion of the carpel with the wall of the cell;—an hypothesis, in some degree supported by the fact, that in several species the termination of the assumed inflected portion is free and not ovuliferous.

But whatever opinion may be adopted as to the relation of this seemingly anomalous to the ordinary structure, it cannot, as M. Fenzl proposes†, be employed as the essential character of a distinct natural family limited to the Linnean genus Mesembryanthemum.

The placenta then of a simple ovarium in its usual state, according to this view, is necessarily double; though by the complete suppression of ovula in one of its two component parts, and their diminished production in the other, the ovarium is not unfrequently reduced to a single ovulum. That such is the origin of the single ovulum is at least manifest in a monstrosity of *Tropæolum majus*, in which the stamina are converted into pistilla, but the complete action being impeded by the presence of the regular trilocular pistillum, and the two marginal cords of each open ovarium remaining distinct, the origin of the ovulum from one only of these cords is satisfactorily shown.

An ovarium with two or a greater number of cells, whose placentæ project into the cavities more or less from their inner angles, is an organ, the composition of which is sufficiently obvious.

But a compound ovarium may be differently constructed; and, first, instead of each simple organ forming a complete cell by the union of its own margins or adjoining portions of its surface, the corresponding margins or adjoining portions of surface of the proximate component parts may unite together so as to form a parietal placenta, often apparently simple, but in reality double in all cases. This view of the composition of a unilocular ovarium having two or more parietal placentæ is also very generally received. But exceptions, supposed to prevail in whole families, in which the disk and not the margins are placentiferous, have lately been assumed by Professor Lindley, *Orchideæ* and *Orobancheæ* being the examples of this structure to which he more particularly refers.

The accurate determination of this question appears to me of great importance to the theoretical botanist, but the subject will be most advantageously discussed after treating of the origin and modifications of stigmata.

An ovarium less manifestly compound is that in which the centre of the cavity is occupied by a placenta entirely unconnected with its sides; the supposed inflected portions of each component organ, according to the view here adopted, being

* Gen. Rem. in Flinders's Voy. vol. ii. Append. p. 598. † *Annal. des Wien. Mus.* vol. i. p. 349.

where the remains of albumen are visible in the apparently ripe seed; and in several *Gesneriaceæ* it exists so sparingly as to become a character of very little value*, especially as it is not here connected with other more important differences.

---

removed, or reabsorbed so completely in a very early stage of its development as to leave no trace of their existence either on the walls of the cavity or on the surface of the central placenta, which may either be polyspermous, or produce only a smaller and definite number of ovula having a relation to its supposed component parts, or, lastly, in some cases be reduced to a single ovulum.

These are the principal modifications of the compound ovarium when forming a simple series; but it is necessary to observe that both surfaces of the inflected and included portions of the carpels are not unfrequently equally productive of ovula, a structure which is manifest in many *Cyrtandraceæ*, especially *Cyrtandra*, although in several other genera of the same family the production is confined to the inner or upper surface of the margin. In other cases the polyspermous ovuliferous portion or placenta is connected with the inner angle of the cell by a single point only, which may proceed either from the apex or base of the cavity. This modification of structure, though in some families hardly of generic importance, seems to me to assist in explaining the apparently anomalous structures of *Hydnora*, *Rafflesia*, and *Brugmansia*.

On the subject of the origin and type of Stigma, my first observation is, that the style where present can only be regarded as a mere attenuation, in many cases very gradual, of the whole body of the ovarium. Hence the idea naturally suggests itself, that the inner margins of the carpel, which in the lower part are generally ovuliferous, in the upper part perform the different, though in some degree analogous, function of stigma. As the function, however, of this organ implies its being external, and as in different families, genera, and even species, it has to adapt itself to various arrangements of parts

---

* The late Correa de Serra, in a very ingenious essay published in 1811[a], endeavoured to establish a test for ascertaining the importance of albumen in relation to the affinities of plants, namely, that where the albumen is of a texture very different from that of the embryo, which does not absorb it in germination, its constancy may be depended on; while in those cases where its texture is nearly similar to that of the embryo, which derives from it its earliest nourishment, its presence or absence becomes of little value. His hypothetical expression of this difference is, that in the latter case the embryo before germination converts part of a uniform substance into its own body, and in germinating derives nourishment from the remainder; in the former it selects what is suited for its nourishment, leaving a residuum which it does not afterwards act upon, and whose presence is therefore constant. Among the examples given of families in which this selection and residuum exist are *Gramineæ*, *Palmæ*, *Nyctagineæ*, *Caryophylleæ*, and *Euphorbiaceæ*.

Soon after the publication of this essay a paper was read before the Linnean Society of London, in which I endeavoured to prove that the test attempted to be established by Correa was liable to many exceptions, and that his hypothetical expression of the facts was not applicable even to all the families he has cited in support of it. And I concluded that as a general rule the point most to be depended on in proving the importance of albumen in systematic botany was its relative quantity, especially when accompanied with a low degree of development of embryo; for where the albumen forms the great mass of the seed in any known portion of a natural family, it may in most cases, though not always, be safely inferred, not only to be present, but to exist in like proportion in the whole of that family. This rule, however, I regarded as merely empirical, founded on extensive experience, but not necessarily connected either with uniformity or even apparent importance of function; for while in some families in which its proportion to the whole body of the seed is the greatest, it constitutes the early nourishment of the embryo, in others, where it exists in equal quantity, it is either not at all or but slightly acted upon in germination. I stated also that there were cases in which this character was of reduced importance, existing only in certain tribes of one and the same great natural family, as in *Rubiaceæ*; nor are there wanting instances in which it is only of generic value[b]. And, lastly, I noticed that in several families, in which the constancy of the character was very general, exceptions occurred, dependent on the apparent necessity for an unusual development and increased energy in the embryo, connected either with the unfavourable circumstances in which it was destined to vegetate, as in plants growing in or exposed to the action of salt-water; or where great resistance, arising from the structure of the pericarpium, or even from the texture of the proper integuments of the seed itself, was to be overcome in germination.

---

[a] *Annales du Muséum*, xviii. p. 206.

[b] Linn. Soc. Trans. vol. x. p. 36, *et Prodr. Flor. Nov. Holl.* vol. i. *passim.*

In describing the genus *Aikinia* (*Epithema* of Dr. Blume) I regarded *Cyrtandraceæ*, or *Cyrtandreæ*, for the reasons now assigned, as a tribe merely of *Gesneriaceæ*, distinguishable from that portion of the order with hypo-

---

destined to act upon it, corresponding modifications of form and position become necessary; hence it is frequently confined to the apex, and very often, especially in the compound ovarium with united styles, appears to be absolutely terminal.

In such cases, as it must always include and be closely approximated to the vascular cord of the axis, it has by some botanists been considered as actually derived from it, which it is, however, only in the same manner as the marginal placentæ are derived from the axis of the carpel. But according to the notion now advanced each simple pistillum or carpel has necessarily two stigmata, which are to be regarded not as terminal, but lateral.

That the stigma is always lateral may be inferred from its being obviously so in many cases; and in one genus at least, *Tasmannia*, it extends nearly the whole length of ovarium, so as to be commensurate with and placed exactly opposite to the internal polyspermous placenta.

That the stigma is always double appears probable from those cases in which it is either completely developed, as in the greater part of *Gramineæ* where the ovarium is simple, in the compound ovarium in *Urena*; and from those in which the development, though less complete, is still sufficiently obvious, as in many *Euphorbiaceæ* and in several *Irideæ*. This degree of development, however, is comparatively rare, confluence between the two stigmata of each carpel being the more usual structure; and in the compound pistillum a greater degree of confluence often takes place in the stigmata than in the placentæ;—a fact, which in all such cases is obviously connected with adaptation of surface to the more complete performance of function.

Another difference frequently occurs between the mode of confluence of placentæ and stigmata, namely, that in the compound but unilocular ovarium, while the placentæ of the adjoining carpels are united, the stigmata of each carpel are generally confluent. But this rule admits of exceptions, as in *Parnassia*, in many *Cruciferæ*, and in *Papaveraceæ*: in all these cases the stigmata as well as placentæ of the adjoining carpels are confluent, a structure satisfactorily proved in *Cruciferæ* by several cases of monstrosity, in which the stamina are transformed into pistilla; and in *Papaveraceæ* by a series of modifications of structure as well as by a like transformation of stamina.

A similar confluence of stigmata in the compound multilocular pericarpium is of much rarer occurrence; it is found, however, in the majority of *Irideæ*, in which the three stigmata alternate with the cells, and consequently with the placentæ of the trilocular ovarium. That this is the correct view of the composition of the stigmata in *Irideæ* is at least probable from their occasional deep division, and more particularly still from the bifid petal-like styles or stigmata which are opposite to the cells of the ovarium in other genera of the same family, as in *Iris* and *Moræa*. In both these arrangements the adaptation to the performance of function is equally manifest.

If the correctness of these observations be admitted, it follows that characters dependent on the various modifications of stigmata are of less value, both in a systematic point of view as determining the limits of families, and theoretically in ascertaining the true composition of organs, than those derived from the analogous differences in the ovaria or placentæ.

In those cases in which the nature of the composition of the ovarium is doubtful, it may, in the first place, be remarked, that wherever in the compound unilocular pistillum the placentæ are double or two-lobed, it is more probable that such placentæ are derived from two adjoining carpels, and are consequently marginal or submarginal, than that they occupy the disk of one and the same carpel: this being entirely the appearance in many cases where the marginal origin of placentæ is admitted; while in the greater part of those in which the disk is known to be ovuliferous, the ovula are never collected in two distinct masses, being generally scattered equally over the surface.

But the double placentæ are manifest in *Orchideæ*, the principal family in which Mr. Lindley considers the ovula as occupying the disk and not the margins. In this family also the alternation of stigmata with placentæ is that relation which is most usual in compound unilocular ovaria, where the apparent number of stigmata and placentæ is equal: and that in *Orchideæ* each apparent stigma is formed by the confluence of the two stigmata of one and the same carpel, is proved by tracing to their origins their vascular cords, which are found to coalesce with those of the three outer foliola of the perianthium.

This view of the composition of the ovarium in *Orchideæ* is confirmed by finding that it agrees with the ordinary arrangement in monocotyledonous plants; namely, the opposition of the double parietal placentæ to the three inner divisions of perianthium*, while in *Apostasia* the three placentæ of the trilocular ovarium are opposite to the three outer divisions: and it is further strengthened on considering what takes place in *Scitamineæ*, where the same agreement is found both in the placentæ of the trilocular ovarium, which in this family is the ordinary structure, and in the unilocular, which is the exception.

---

* Denham, Trav. in Afr., Append. p. 243.

gynous corolla, or *Besleriea*, by characters either of little importance or which required confirmation. For although, in addition to the characters referred to, *Cyrtandreæ* differ very remarkably in geographical distribution from the rest of the family, yet this difference is not entirely without exception, as I have already noticed in my account of *Loxotis*.

But whether these groups be considered as distinct families, or as tribes only, it will probably be admitted that in a natural classification *Cyrtandreæ* must stand next to *Besleriea*; while on the other hand they appear to be very nearly related to *Bignoniaceæ*, with which they are connected through *Incarvillea*, particularly with that section of it which in Dr. Royle's Illustrations I have described as a sub-genus and named *Amphicome*. This sub-genus Professor Lindley has lately considered generically distinct from *Incarvillea*. But except those differences in the seeds and calyx, which I have regarded, and still consider, as only of sectional value, I find no other characters whatever in the flower or fruit to justify the separation; for in both species of *Amphicome*, as in the original *Incarvillea*, the ovarium as well as the capsule is certainly bilocular, and not unilocular, as it is described in the species figured in the 'Botanical Register' (for 1838, t. 19), and the two subgenera entirely agree in the peculiar structure of the anthera, the spur of each of whose loculi originates not on the back but front of the cell, in the line of dehiscence, which it limits.

I am aware that the agreement of *Orchideæ* with the usual relation of parts in Monocotyledones is not admitted by M. Achille Richard, nor by Mr. Lindley, who has adopted his hypothesis respecting the structure of the flower in this family. According to M. Richard the outer series of perianthium is generally wanting, being found only in one genus, *Epistephium*: the three outer divisions actually existing in the whole order, according to this view, become petals, and the three inner divisions sterile petaloid stamina.

I have some years ago stated several objections to this hypothesis; at present I shall advert to one of those only, considering it as conclusive, namely, the position of the two lateral stamina, which are generally rudimentary, but in some cases perfectly developed, in this family. In several species of *Cypripedium*, which is one of these cases of perfect development, I had then ascertained, by means of numerous transverse sections made at various heights in the column and at its base, that their vascular cords united with those of the two lateral inner divisions of the flower, while that of the third, generally the only perfect stamen, is manifestly opposite to the anterior division of the outer series. The position of stamina, therefore, so far from being regular, as the hypothesis in question considers it, is absolutely without example, two of the inner series being opposite to two of the supposed outer series of stamina.

A very different view respecting the formation of the ovarium in *Orchideæ* is that first advanced by Mr. Bauer and adopted by Mr. Lindley, namely, that it consists of six carpels, of which three, placed opposite to the outer series of perianthium or sepals, are sterile; the remaining three, opposite to the inner series, or petals, being fertile, and bearing their placentæ on their axes or disks.

The chief argument in support of this view is no doubt derived from the very remarkable dehiscence of the capsule into six valves. But I have elsewhere pointed out cases where an analogous dehiscence occurs, in which, however, a similar composition has never been supposed to exist: and if the presence of six vascular cords in sections of the ovarium be likewise adduced in favour of the opinion, I may add that I have in the same place remarked that these vascular bundles belong not to the ovarium only, but also to the perianthium and stamina, and are equally observable in other families with adherent ovarium, as *Irideæ*, in which a similar composition has never been inferred.

With regard to the second family, in which Mr. Lindley believes the disk of the carpel to be ovuliferous, namely, *Orobancheæ*, I find no other argument advanced in support of this view than that derived from the bursting of the capsule into two lateral valves: but an opinion founded on dehiscence only may be said to be a mere begging of the question; division through the axis of carpels, especially in the families related to *Orobancheæ*, being nearly as common as separation of their margins. In this family also, as in *Orchideæ*, the placentæ are double, an argument in favour of their submarginal origin: and although, whether the carpels be regarded as lateral, or anterior and posterior, the placentæ are not strictly marginal, yet there are other families where a similar position of placentæ is found, but in which the structure assumed in this hypothesis has never been suspected. As to the supposed affinity of *Orobancheæ* with *Gentianeæ*, which might be adduced in support of this view, as far as it is founded on the assumed agreement of the two orders in the lateral position of their carpels, the argument, even if correct, would hardly be conclusive; for in *Gentianeæ* there is at least one genus having quadrifid and another with quinquefid

The following characters of *Gesneriaceæ*, and of the three tribes of which, according to my view, it consists, may serve to distinguish the family from the nearly related orders, and the tribes readily from each other.

GESNERIACEÆ, *Richard et de Jussieu.*

Calyx 5-divisus, æqualis (rarò parùm inæqualis). *Corolla* monopetala, irregularis, limbo 5-lobo, æstivatione imbricata. *Stamina* antherifera 2 v. 4, cum v. absque quinti postici rudimento. *Ovarium* (liberum v. adnatum) uniloculare (nunc approximatione placentarum quasi biloculare); basi disco lobato v. indiviso cinctum; *placentis* 2 parietalibus lateralibus (sæpiùs bilamellosis) polyspermis; *ovulis* anatropis. *Pericarpium* capsulare v. baccatum. *Semina* parva, (raphe nulla), albuminosa v. exalbuminosa; albumine carnoso, molli, copioso v. parco. *Embryo* rectus, axilis, orthotropus, dimidium albuminis dum adsit æquans v. superans.

Herbæ v. Suffrutices *foliis simplicibus, indivisis, exstipulatis, oppositis, verticillatis alternisve, sæpiùs serratis crenatisve nunc integerrimis, in plerisque pube simplici, acuta v. capitata.* Inflorescentia *varia.*

GESNERIEÆ.

Calyx cum ovario plùs minùs connatus. *Pericarpium* capsulare. *Semina* albumine copioso.

BESLERIEÆ.

Calyx liber. *Pericarpium* baccatum v. capsulare. *Semina* albuminosa.

CYRTANDREÆ.

Calyx liber. *Pericarpium* capsulare v. baccatum. *Semina* exalbuminosa v. albumine parco.

Obs. The following remarks relate to the modifications of the different parts of fructification in *Cyrtandreæ* and their relative importance in characterising genera.

The CALYX admits of every degree of depth of division. Its segments are generally acute, always so when divided to the base; and wherever acute the æstivation appears to be valvular. In several cases where the calyx is tubular, particularly in the greater part of true *Didymocarpus*, and in one of the sections of *Æschynanthus*, the segments are rounded and the æstivation necessarily overlapping. The tubular calyx, when accompanying an elongated capsule, is generally thrown off or separates transversely at the base, except in the few cases in which the capsule is pedicellated. The deeply divided calyx of the genera with elongated capsules is persistent; as it also is, whether deeply divided or tubular, in all those with short capsules and in the baccate genera. None of

flowers, in which the carpels are not lateral, but anterior and posterior, as I believe them to be in *Orobancheæ*; nor has it ever been supposed that in *Gentianeæ* the disk or axis is ovuliferous.

In the account now given of the modifications of ovarium and stigma, I have, in conformity with the ordinary language of botanists, employed the term *confluence*, by which, however, is not to be understood the union or cohesion of parts originally distinct, for in the great majority of cases the separation or complete development of these parts from the original cellular and pulpy state has never taken place. But with this explanation the word may still be retained, unless connate should be considered less exceptionable.

I have also assumed that ovula belong to the transformed leaf or carpel, and are not derived from processes of the axis united with it, as several eminent botanists have lately supposed. That the placentæ and ovula really belong to the carpel alone is at least manifest in all cases where stamina are changed into pistilla. To such monstrosities I have long since referred in my earliest observations on the type of the female organ in phænogamous plants*, and since more particularly in my paper on *Rafflesia*†: the most remarkable instances alluded to in illustration of this point being *Sempervivum tectorum, Salix oleifolia*, and *Cochlearia armoracia*, in all of which every gradation between the perfect state of the anthera and its transformation into a complete pistillum, is occasionally found.

* In Linn. Soc. Transact., vol. xii. p. 89.

† *Ibid.*, vol. xiii. p. 212, *note*.

these modifications appear to be of generic value, though some of them form the principal characters of very natural sections of genera.

The *tube* of the COROLLA varies greatly in length, but its various proportions, either with respect to the limb or calyx, are seldom of generic importance; a difference of this kind, however, forms the only distinguishing character between *Bæa* and *Streptocarpus*. The limb varies considerably in form, direction, and proportion of lips; but the most important modification occurs in *Glossanthus* and *Loxotis*, in both of which the lateral lobes of the lower lip are obsolete; or, in the former genus, perhaps, altogether wanting. This modification is necessarily accompanied by a different æstivation, which in all the other genera is quincuncial, the lateral lobes of the lower lip overlapping the upper, which covers the middle lobe of the lower. The spur of the tube is found only in one of the two species of *Stauranthera*.

The number of antheriferous STAMINA, or the difference between the diandrous and didynamous plants of the tribe, is not always of much value; for in *Didymocarpus* there are several didynamous species which certainly do not form a natural section. *Stamina inclusa* and *exserta* generally mark distinct genera, but yet not in all cases. The difference between parallelism and divarication of the lobes of antheræ is always, I believe, of generic importance. The various degrees of confluence of the divaricate lobes, and the apparently peculiar dehiscence in some of its modifications, seem not to be of equal value.

The STIGMA exhibits various remarkable differences, some of which are of considerable, though not always of equal, value in the definition of genera. The most important of these, and which hitherto has been overlooked, is the abortion, or great reduction in size, of the upper lip, while the lower is proportionally dilated, and, in some cases, deeply divided. Thus in *Chirita*, in which the stigma is described as bilamellar, both lamellæ belong to the lower lip. And in many species of *Didymocarpus* the apparent obliquity of stigma arises from the abortion of the upper lip, and the lamellar expansion of the lower, which, however, is never divided as in *Chirita*. In several genera the lips are equal, and either lamellar or so short as to be hardly distinguishable; in other cases there is no trace of division. These different modifications, in most cases, mark the limits of genera.

As some of the most important characters of the tribe reside in the structure of OVARIUM and of PERICARPIUM, so the principal natural divisions are founded on modifications of the same organ. The ovarium may be in all cases described as properly unilocular; though, from the approximation and slight cohesion of the parallel portions of the inflected parts, or, as they are commonly called, placentæ, it not unfrequently appears to be bilocular. But this cohesion only occurs when the production of ovula is confined to the upper or inner surface of the carpel, which is the case in the greater part of the genera with elongated capsules; for where both surfaces are ovuliferous, as in the baccate and most of the genera with included capsules, no such cohesion can take place. The general direction of the margins of the placenta of each component part of ovarium and pericarpium may at first appear a deviation from the ordinary structure, the general rule being that the margins only unite to form a complete cell, whereas the completion of the cell in that manner is incompatible with the direction of these margins, which in each carpel are turned from, not towards each other. This difference, however, is more apparent than real, and the structure in *Cyrtandreæ* may be justly compared with that of such genera of other families as have the placenta of a multilocular, or that of the single distinct carpel projecting considerably into the cavity.

The great elongation of pericarpium in many of the genera having capsular fruit, is the more remarkable in *Cyrtandreæ*, as there is no instance of similar elongation, or any approach to it, in either of the two other tribes of *Gesneriaceæ*. In this elongation of capsule, however, they approach to *Bignoniaceæ*, where it is both more general and exists in a still greater degree.

In most of the *Cyrtandreæ* with elongated capsules, the valves, though membranaceous, are perfectly straight, but in a few others they are spirally twisted, though nearly of the same texture. The spiral torsion of the valves certainly does not depend on the length of the capsule merely, the greatest length being found conjoined with straight valves, as in *Æschynanthus*; nor is it the consequence of drying, for the twisting in all cases commences long before the ripening of the fruit. The mechanism explaining these differences is, however, in general ob-

vious. In the twisted valve the endocarp consists of a stratum of vertically elongated fibres, with an extremely thin or hardly manifest inner membrane, while in the valve of the straight capsule the vertically elongated stratum has a manifest inner covering, consisting of transversely elongated cells, which no doubt counteract the tendency to torsion of the longitudinal fibres. But the transversely elongated cells are found in the inflected or placentiferous portion of the elongated capsule, both in the twisted and straight-fruited genera; and their function here seems to be to determine the involution or revolution of the ovuliferous margin, which in these fruits is probably necessary for the protection of the seeds even after dehiscence.

The more remarkable differences in placentation are almost always important: thus, in many genera the ovula are produced on the inner surface of the margin only; in others both surfaces are equally productive; and in some, the production, instead of being confined to the marginal region, extends over the whole of the inflected and included portion of the carpel.

The SEEDS are generally pendulous, but in a few genera, as *Epithema* and *Loxocarpus*, erect; and in some others they vary in pericarpial direction, according to their different heights in the same placenta. They are always minute, generally oval, oblong, or nearly cylindrical, and inserted at or very near one extremity; in most cases sessile, or nearly so, but in a few furnished with a very long and extremely slender funiculus.

Although the ovulum is anatropous, there is no apparent raphe in the ripe seed. The capillary appendages existing in some cases at both extremities of the seed vary considerably in number and form in that genus where they are most remarkable, namely *Æschynanthus*, in which, as well as in *Agalmyla*, and probably in *Tromsdorffia*, they are mere appendages, performing no other function; but in *Lysionotus* the upper hair in the pendulous seed is in reality its funiculus or attenuated base.

The integument of the ripe seed is, in most cases, apparently simple; but in a few, especially *Æschynanthus*, the inner membrane is easily separable from the testa.

Before the complete ripening of the seed, the semifluid remains of ALBUMEN are generally obvious; and even in the ripe seed, in several cases, slight traces of it are visible: in *Rhabdothamnus* it is more abundant, and of firmer consistence.

CYRTANDREARUM SYNOPSIS GENERUM.

A. PERICARPIUM CAPSULARE.

† *Capsulæ* elongatæ. *Semina* utrinque appendiculata.

α. *Antheræ* exsertæ, inappendiculatæ, loculis linearibus parallelis. *Semina* pendula, extremitate superiore nuclei (nec appendicis) affixa.

ÆSCHYNANTHUS. *Stamina* antherifera 4. *Stigma* indivisum, dilatatum.

TROMSDORFFIA. *Stamina* antherifera 4. *Stigma* bilamellatum.

AGALMYLA. *Stamina* antherifera 2. *Stigma* bilamellatum.

β. *Antheræ* (2) inclusæ, dorso appendiculatæ. *Semina* pendula, extremitate setæ superioris affixa.

LYSIONOTUS.

†† *Capsulæ* elongatæ. *Semina* inappendiculata, sessilia. *Antheræ* inclusæ, loculis divergentibus.

CHIRITA. *Stamina* antherifera 2. *Stigma* labio superiore obsoleto; inferiore bilamellato. *Capsula* valvis strictis, (nec spiralitèr tortis.)

DIDYMOCARPUS. *Stamina* antherifera 2—4. *Stigma* indivisum (sæpè ex abortione labii superioris obliquum.) *Capsula* valvis strictis.

STREPTOCARPUS. *Stamina* antherifera 2. *Capsula* valvis spiralitèr tortis. *Corollæ* tubus calyce duplò multotièsve longior.

BÆA. *Stamina* antherifera 2. *Capsula* valvis spiralitèr tortis. *Corollæ* tubus calycem vix æquans.

††† *Capsulæ* calyce longiores, hinc longitudinalitèr dehiscentes. *Semina* erecta, funiculis elongatis.

LOXOCARPUS.

†††† *Capsulæ* subovatæ, calyce inclusæ: *placentis* utrinque seminiferis.

EPITHEMA. *Capsula* circumscissa. *Stamina* duo superiora antherifera!

STAURANTHERA. *Capsula* circumscissa. *Stamina* antherifera 4. *Calyx* 5-fidus, sinubus plicatis!

LOXONIA. *Stamina* antherifera 4, exserta. *Capsula* bivalvis. *Calyx* 5-partitus.

GLOSSANTHUS. *Stamina* antherifera 4, inclusa. *Calyx* 5-fidus, tubo 5-gono. *Capsula* bivalvis.

LOXOTIS. *Stamina* antherifera 2, inclusa. *Calyx* 5-fidus, tubo angulato. *Capsula* bivalvis.

MONOPHYLLÆA. *Stamina* antherifera 4. *Calyx* 5-partitus, æstivatione imbricata. *Capsula* ruptilis?

PLATYSTEMMA. *Stamina* antherifera 4, exserta. *Calyx* 5-fidus, æstivatione valvata. *Corollæ* tubo brevissimo, limbo patenti. *Capsula*?

RHABDOTHAMNUS. *Stamina* antherifera 4. *Corolla* tubo campanulato. *Stigma* bilobum. *Capsula* 4-valvis. *Semina* albuminosa!

B. PERICARPIUM BACCATUM.

FIELDIA. *Stamina* antherifera 4, antherarum loculis parallelis. *Calyx* 5-partitus. *Corolla* tubulosa. *Stigma* bilobum. *Bacca* exsucca.

RHYNCHOTHECUM. *Stamina* antherifera 4, antheris bivalvibus, valvulâ interiore minore. *Calyx* 5-partitus.

CENTRONIA. *Stamina* antherifera 4, antheris basi calcaratis. *Calyx* spathaceus. *Bacca* siliquæformis.

CYRTANDRA. *Stamina* antherifera 2, inclusa, antherarum loculis parallelis. *Calyx* 5-fidus.

WHITIA. *Stamina* antherifera 2, semiexserta, antherarum loculis haud parallelis. *Calyx* 5-partitus.

ÆSCHYNANTHUS, *Jack in Linn. Trans.*, 14, p. 42.

CHAR. GEN. *Calyx* 5-divisus (tubulosus v. partitus). *Corolla* bilabiata. *Stamina* antherifera 4, antherarum loculis parallelis. *Stigma* indivisum, dilatatum, sub-infundibuliforme. *Capsula* elongata, valvis strictis. *Semina* pendula, apice nuclei affixa, utrinque pilifera, pilo inferiore unico; superiore unico, duplici pluribusve.

Suffrutices *in arborum cortice radicantes; foliis oppositis æqualibus, integerrimis, coriaceis venis obsoletis.*

† *Calyx* tubulosus, ore 5-lobo obtuso. *Semina* utrinque monotricha, pilo superiore basi dilatata.

1. *Æschynanthus volubilis*, Jack, l. c. t. 2, f. 3.
2. *Æschynanthus radicans*, Jack, l. c. p. 43.

3. *Æschynanthus parvifolia*, calyce pilosiusculo sub-campanulato, foliis elliptico-lanceolatis glabris.
Loc. Banca, 1813. Dr. Horsfield.

†† *Calyx* tubulosus 5-dentatus acutus. *Semina* . . .

4. *Æschynanthus fulgens*, Wall. List, No. 797.

††† *Calyx* 5-fidus acutus. *Semina* extremitate superiore ditricha.

5. *Æschynanthus parasitica*, Wall. List, No. 796.
6. *Æschynanthus ramosissima*, Wall. List, No. 799, & Pl. Asiat. Rar., 1, p. 55, t. 71.

7. *Æschynanthus Griffithii*, calyce 5-partito glabro: laciniis lanceolatis, filamentis hirsutis, foliis lanceolatis.
Loc. Tavoy? D. Griffith.

†††† *Calyx* 5-partitus v. altè 5-fidus, acutus. *Semina* utrinque monotricha, pilo superiore basi simplici.

8. *Æschynanthus Horsfieldii,* glabra, calyce 5-partito: laciniis lineari-lanceolatis, seminum pilis subulatis, foliis ovato-lanceolatis sub-acuminatis.

Loc. Java, an. 1814. Dr. Horsfield.

9. *Æschynanthus bracteata,* Wall. List, No. 794.

10. *Æschynanthus acuminata,* Wall. List, No. 6397.

††††† *Calyx* abbreviatus, cyathiformis, dentatus. *Semina* utrinque monotricha, pilo superiore basi dilatata.

11. *Æschynanthus Wallichii.*

Æschynanthus radicans, *Wall. List, n.* 798, non Jack.

Loc. Singapore.

†††††† *Calyx* . . . . *Semina* extremitate superiore comosa, pilis indefinitè numero

12. *Æschynanthus longicaulis,* Wall. List, n. 888.

TROMSDORFFIA.

Tromsdorffiæ Sp. *Blume, Bijdr.,* p. 762.

CHAR. GEN. *Calyx* 5-fidus, acutus. *Corolla* tubulosa, bilabiata. *Stamina* antherifera 4; antheris exsertis, loculis parallelis. *Stigma* bilamellatum (labiis æqualibus). *Capsula* . . . *Semina* . . .

Herba *radicans; foliis alternis dentatis.*

Tromsdorffia ? elongata, Blume, Bijdr., p. 763.

AGALMYLA.

Agalmylæ Sp., *Blume, Bijdr.,* p. 766.

CHAR. GEN. *Calyx* 5-partitus, acutus. *Corolla* tubulosa, bilabiata. *Stamina* antherifera 2; antheris exsertis, loculis parallelis. *Stigma* bilamellatum (labiis æqualibus). *Capsula* elongata, valvis strictis. *Semina* pendula, apice nuclei affixa, utrinque monotricha.

Herba *radicans; foliis alternis dentatis.*

Agalmyla staminea, Blume, Bijdr., p. 767.

LYSIONOTUS, *Don, Prodr. Fl. Nepal.,* p. 124.

CHAR. GEN. *Calyx* 5-partitus, acutus. *Corolla* bilabiata, fauce bicallosa. *Stamina* antherifera 2, inclusa. *Antheræ* dorso appendiculatæ, imberbes. *Stigma* indivisum. *Capsula* elongata, valvis strictis. *Semina* utrinque in pilum producta, apice pili superioris affixa.

Herba; *foliis subverticillatis, serratis.* Inflorescentia *cymosa.*

Lysionotus serratus, Don, Prodr. Fl. Nepal., p. 124.

L. ternifolia, *Wall. Pl. Asiat. Rar.,* 2. p. 20, t. 118.

CHIRITA, *Buchan. Hamilt. in Don, Prodr. Fl. Nepal.,* p. 89.

CHAR. GEN. *Calyx* 5-fidus, æstivatione valvata. *Corolla* tubulosa, bilabiata. *Stamina* duo antherifera; *antheræ* (sæpius barbatæ) loculis divergentibus. *Stigma*: labio superiore abortiente v. nano; inferiore bilamellato. *Capsula* elongata, valvis strictis. *Semina* inappendiculata, pendula.

Herbæ *v.* Suffrutices; *foliis oppositis sæpius inæqualibus, altero in quibusdam nano v. abortiente; pedunculis axillaribus.*

1. *Chirita urticifolia,* foliis inæqualibus ovatis acutis serratis elongato-petiolatis, pedunculis subsolitariis medio bibracteatis, calycis laciniis subulatis, antheris imberbibus!

Chirita urticifolia, *Buchanan Hamilton MSS. Don, Nepal.* 90.

Chirita grandiflora, *Wall. Pl. Asiat. Rar.,* 1. *p.* 43, *t.* 50.

2. *Chirita flava,* Wall. List, n. 801. (*Calosacme.*)
Chirita pumila, *Don, Nepal.,* p. 90.

3. *Chirita acuminata,* Wall. List, n. 802. (*Calosacme.*)
Incarvillea oblongifolia, *Roxb. Ind. vol.* 3, *p.* 113.

4. *Chirita dimidiata,* Wall. List, n. 803. (*Calosacme.*)

5. *Chirita bifolia,* Don, Prodr. Fl. Nepal., p. 90, Royle, Illustr., p. 294, t. 70, f. 2.

6. *Chirita macrophylla,* Wall. List, n. 805, (*Calosacme,*) & Pl. Asiat. Rar., 1, p. 56, t. 72.

7. *Chirita Horsfieldii,* foliis ovato-oblongis acutis serratis scabris inæqualibus, bracteis orbiculatis calycibusque coloratis, stigmatis lamellis latioribus quàm longis.
Didymocarpus barbata, *Jack, in Linn. Soc. Trans.,* 14, p. 38?
Tromsdorffia speciosa, *Blume, Bijdragen,* p. 762 ? ?
Loc. Java, an. 1814. Dr. Horsfield.

8. *Chirita scaberrima,* foliis ovatis acutis crenatis scaberrimis, stigmatis lamellis longioribus quàm latis.
Loc. Java orientalis, *Dr. Horsfield.*

9. *Chirita cœrulea,* annua, foliis ovatis acutiusculis obsoletè dentatis subæqualibus lævibus, pedunculis apice diphyllis: foliolis reniformibus basi hinc (sæpiùs) connatis, pedicellis ebracteatis subseriatis.
Loc. Java, an. 1814. Dr. Horsfield.

10. Chirita *hamosa,* foliis oppositis subæqualibus oblongis subovatisve, pedunculo communi cum petiolo connato; pedicellis seriatis bifidis simplicibusve.
Didymocarpus? hamosa, *Wall. List, n.* 788.
Loc. Trogla in Martabania, *D. Wallich.*

Didymocarpus, *Wall. in Malay. Misc.* 1, No. 5, p. 1.

Char. Gen. *Calyx* 5-divisus (v. tubulosus 5-fidus, v. 5-partitus). *Corolla* tubulosa, bilabiata. *Stamina* anthe-rifera 2 (raro 4) inclusa, antheris imberbibus, loculis divergentibus. *Stigma* indivisum (sæpè, ex abortione labii superioris, obliquum). *Capsula* elongata, valvis strictis. *Semina* inappendiculata, sessilia.
Herbæ, *pubescentes, caulescentes vel acaules; foliis serratis crenatisve petiolatis, caulinis oppositis, verticillatis alternisve; inflorescentia subcymosa.*

CLAVIS SPECIERUM.

A. Diandræ.

† *Calyx* infundibuliformis, coloratus, tubo lobos superante, in plerisque basi transversìm secedens.

α. *Calycis* lobi rotundati. *Stigma* obliquum (unilabiatum). Bracteæ perfoliatæ, coloratæ.

1. Caulescentes.
Didymocarpus aromatica, villosa, oblonga, acuminata, punduana.

2. Acaules.
Didymocarpus macrophylla, pedicellata.

β. Calycis lobi acuti (glanduloso-pilosi).
Didymocarpus subalternans, obtusa.

†† Calyx 5-partitus acutus persistens.

α. Placentæ latitudine valvularum, marginibus ovuliferis longitudinalitèr revolutis.

1. Caulescentes.
Didymocarpus crinita, serrata, racemosa, corniculata, cordata, corchorifolia, reptans.

2. Acaules.
Didymocarpus missionis, Zeylanica.

β. Capsula hinc dehiscens, inde diù cohærens. Placentæ valvis angustiores.

Didymocarpus Rottleriana.

B. Didynamæ.

α. Caulescentes.

Didymocarpus frutescens, elongata.

β. Acaulis.

Didymocarpus lanuginosa.

Specierum Diagnoses.

A. Diandræ. Calyce tubuloso infundibuliformi.

α. Calycis lobi rotundati.

1. ***Didymocarpus aromatica,*** foliis ovatis obovatisve inciso-crenatis, caule apice foliato petiolisque pube appressa.
Didymocarpus aromatica, *Wall. Pl. Asiat. Rar.* 2, p. 34, t. 141, exclus. fig. 4—7, ad Didymocarpum macrophyllam pertinentibus.
Didymocarpus primulifolia, *Don, Nepal.* p. 123.
Loc. Nepal.

2. ***Didymocarpus villosa,*** foliis obovatis inciso-crenatis adultis subsericeis, caule apice foliato petiolisque villis patulis hirsutissimo.
Didymocarpus villosa, *Don, Nepal.* p. 123.
Loc. Nepal.

3. ***Didymocarpus oblonga,*** foliis oblongo-lanceolatis inciso-serratis adultis cauleque apice foliato glabriusculis.
Didymocarpus oblonga, *Wall. in litt.* 1819, *et Plant. Asiat. Rar. vol.* 2, *p.* 34, *tab.* 140. *Don, Nepal. p.* 123.
Didymocarpus verticillata, *Wall. List, n.* 783.
Loc. Nepal.

4. ***Didymocarpus Punduana,*** foliis ternis caulem glabriusculum terminantibus oblongis integris, pedunculis pedicellisque pube glandulosa conspersis.
Didymocarpus Punduana, *Wall. List, n.* 777.
Loc. Montes Sylhet.

5. ***Didymocarpus acuminata,*** foliis caulem terminantibus approximatis latè ovatis acuminatis duplicato-crenatis, pedicello capsulæ calycem persistentem superante.
Loc. Chura-Poongi, *Wallich.*

6. ***Didymocarpus pedicellata,*** acaulis, ovariisc glandulosis, capsulæ pedicello calycem persistentem superante, stylo brevissimo.
Didymocarpus macrophylla, *Royle, Illustr.*, p. 294, t. 70, f. 1.
Loc. Kamoon, *Royle.*

7. ***Didymocarpus macrophylla,*** acaulis, ovariis glandulis sessilibus conspersis, capsulæ pedicello brevissimo.
Didymocarpus macrophylla, *Wall. List, n.* 784. *Don, Nepal.* p. 122.
Didymocarpus plicata, *Don, Nepal,* p. 122.
Loc. Nepal, *Wallich.*

β. Calycis lobi acuti.

8. ***Didymocarpus subalternans,*** caulescens, foliis oppositis suboppositisve obtusis elongato-petiolatis.
Didymocarpus subalternans, *Wall. List, n.* 782.
Didymocarpus aromatica, *Don, Nepal.* p. 123.
Loc. Nepal, *Wallich.*

9 ***Didymocarpus obtusa,*** scapis subradicalibus bifoliatis, foliis radicalibus elongato-petiolatis cordato-ovatis crenatis obtusis.
Didymocarpus obtusa, *Wall. List, n.* 786.
Didymocarpus cinerea, *Don, Nepal.* p. 122.
Loc. Nepal, *Wallich.*

B. Diandræ. Calyce 5-partito acuto. Capsula utrinque simul dehiscens.

10. ***Didymocarpus crinita,*** Jack, in Linn. Trans., 14, p. 33, t. 2, f. 2.
Loc. Java, an. 1814, *Horsfield.* Penang, *Jack, Wallich.*

11. *Didymocarpus serrata*, foliis oppositis æqualibus elliptico-lanceolatis serrulatis acutissimis: basi acuta æquali, cymis bifidis, corollæ tubo limbum quadruplò superante.
Loc. Sumatra? *Horsfield.*

12. *Didymocarpus racemosa*, Jack, l. c. p. 34.

13. *corniculata*, Jack, l. c. p. 36.

14. *cordata*, Jack, Wall. List, no. 781.

15. *corchorifolia*, Wall. List, no. 792.

16. *reptans*, Jack, l. c. p. 35.

17. *Didymocarpus missionis*, caule brevissimo, pedunculis axillaribus scapiformibus, foliis cordato-ovatis.
Didymocarpus? missionis, *Wall. List, no.* 639.

18. *Didymocarpus Zeylanica*, sub-acaulis, scapis paucifloris, foliis orbiculato-ovatis altè cordatis dentatis petiolo longioribus, calycis laciniis linearibus acutis.
Loc. Zeylona.

C. Diandra. Calyce 5-partito acuto. Capsula hinc dehiscens inde diù cohærens.

19. *Didymocarpus Rottleriana*, Wall. List, n. 778.

D. Didynamæ.

20. *Didymocarpus frutescens*, Jack, in Linn. Soc. Trans. vol. xiv. p. 39. Wall. List, n. 780.
Loc. Penang.

21. *Didymocarpus elongata*, Jack, in Linn. Soc. Trans. vol. xiv. p. 37.
Loc. Sumatra, *Jack*, *Horsfield.*

22. *Didymocarpus lanuginosa*, Wall. List, n. 791.

Streptocarpus, *Lindl. Bot. Regist.* 1173.

Char. Gen. *Calyx* 5-partitus. *Corolla* bilabiata: tubo calycem duplò multotièsve superante. *Stamina* antherifera 2, inclusa: antherarum loculis divergentibus. *Stigma* bilobum: labiis æqualibus brevissimis. *Capsula* elongata valvis (dextrorsùm) spiralibus. *Semina* inappendiculata.

Herbæ *pubescentes vel caulescentes, foliis oppositis subæqualibus, inflorescentia cymosa; vel caule brevissimo, folio altero nano, pedunculis seriatis.*

† Caule abbreviato; foliis oppositis, altero nano; pedunculis seriatis axillaribus.

1. *Streptocarpus Rexii*, Lindl. in Bot. Regist., t. 1173.
Didymocarpus Rexii, *Hooker in Bot. Mag.*, t. 3005.
Loc. Africa australis.

†† Caulescentes, foliis oppositis subæqualibus petiolatis. Inflorescentia axillaris subcymosa.

2. *Streptocarpus Helsingbergii*, foliis ovatis crenatis petiolo quadruplo longioribus, cymis paucifloris, corollæ tubo calycem 4—5-iès superante.
Loc. Madagascar, *Helsingberg & Bojer.*

3. *Streptocarpus Bojeri*, foliis ovatisacutis grossè et subduplicato-crenatis petiolo quadruplo longioribus, corollæ tubo calyce duplò longiore.
Loc. Madagascar, *Helsingberg & Bojer.*

4. *Streptocarpus Thompsonii*, foliis subovatis ovalibusque crenato-serratis petiolo paulò longioribus, corollæ tubo calyce duplò longiore.
Loc. Madagascar, *D. I. V. Thompson.*

5. *Streptocarpus paniculata*, foliis ovatis acutis crenato-serratis brevè petiolatis, cymis elongato-pedunculatis paniculatis.
Loc. Madagascar.

BÆA, *Commerson, in Lam. Enc. Méth.* 1. *p.* 401. *et in Juss. Gen. Plant. p.* 121.

CHAR. GEN. *Calyx* 5-partitus. *Corolla* bilabiata tubo calycem vix æquante. *Stamina* antherifera 2, antherarum loculis divergentibus. *Stigma* obtusum (subbilobum). *Capsula* elongata, valvis (dextrorsùm) spiralibus. *Semina* inappendiculata.

Herbæ *subacaules, foliis confertis; v. caulescentes, foliis oppositis.*

1. *Bæa Commersonii*, caule abbreviato, foliis ovalibus ellipticisve obsoletè crenato-serratis petiolatis pube appressa subsericeis, pedunculis scapiformibus uni- pauciflorisve: pedicellis calycibusque pube appressa eglandulosa.

Bæa Magellanica, *Lam. Enc. Méth.* i. p. 401.

Loc. "Isles Praslin," *Commerson.*

2. *Bæa hygrometrica*, acaulis, foliis ovatis obovatisve crenatis utrinque lanatis basi cuneatis subsessilibus, scapis folio longioribus apice divisis, pedicellis calycibusque pube glandulosa patula.

Dorcoceras hygrometrica, *Bunge, in Mém. Acad. Imper. Sc. Petersb. Div. Sav. tom.* ii. *p.* 128.

Loc. China Borealis, *Bunge.*

3. *Bæa? Wallichii*, acaulis, foliis obovatis crenatis crassis, scapis apice 2—4-floris.

Didymocarpus helicteroides, *Wall. List, n.* 789.

Loc. Toong Dong, *Wallich.*

Obs. Flores nondum visi, ideoque dubii generis. Capsula *Streptocarpi* et *Bææ.*

4. *Bæa? multiflora*, caule suffruticoso, foliis oppositis petiolatis oblongis ovalibusve crenatis, paniculis axillaribus pedunculatis lanatis.

Didymocarpus? multiflora, *Wall. List, n.* 793.

Loc. Sylhet in montibus Punduah.

Obs. Flores inexpansi solùm a nobis visi: tubo brevi corolla ni fallor cum Bæa convenit sed habitus diversissimus.

LOXOCARPUS.

CHAR. GEN. *Calyx* 5-partitus. *Corolla* tubo brevi. *Stamina* antherifera duo, antherarum loculis divergentibus. *Stigma* indivisum. *Capsula* calyce (paulò) longior, hinc dehiscens, placentis angustissimis. *Semina* erecta, funiculis capillaribus elongatis.

Herba *annua, incana; foliis omnibus radicalibus petiolatis.* Scapi *apice subcorymbosi.*

Loxocarpus incana.

Loxonia? alata. *Wall. List, No.* 809.

Loc. Penang.

EPITHEMA, *Blume, Bijdrag., p.* 737.

Aikinia, *Br. in Wall. Pl. Asiat. Rar.* 3. *p.* 65. *t.* 288.

CHAR. GEN. *Calyx* tubulosus 5-fidus. *Corolla* bilabiata. *Stamina* duo superiora antherifera! *Stigma* indivisum. *Capsula* calyce cincta, circumscissa; placentis liberis, utrinque seminiferis, pedicellis parietalibus adnatis. *Semina* erecta, funiculis elongatis.

Herbæ *annuæ, pilosiusculæ.* Folia *cordata, subdentata, inferiora, dum uno plura, alterna, terminalia subopposita.* Spicæ *unilaterales, circinales; hinc pedicellis subduplici serie confertis ebracteolatis, inde foliolo cucullato subrotundo involucratæ.*

STAURANTHERA, *Bentham in Scrophul. Ind.*, p. 57.

CHAR. GEN. *Calyx* turbinato-campanulatus, 5-fidus, sinubus plicatis (quandoque in dentibus productis). *Corolla* subrotata, bilabiata, 5-loba; tubo nunc basi calcarato. *Stamina* antherifera 4; antheræ in coronulam conniventes, loculis divaricatis. *Stigma* .... *Capsula* calyce persistente cincta, circumscissa; placentis utrinque seminiferis.

Herba *oppositifolia, folio altero nano stipuliformi.*

1. *Stauranthera grandifolia*, corollæ tubo basi calcarato, calycis sinubus in dentibus productis.
Stauranthera grandifolia, *Bentham Scrophul. Ind.*, p. 57.
Glossanthus? grandiflora, *Benth. in Wall. List, n.* 6395.
Loc. Penang.

2. *Stauranthera ecalcarata*, corollæ tubo ecalcarato.
Miquelia cœrulea, *Blume in Bullet. des Sc. Phys. et Nat. en Neerlande, an.* 1838, *p.* 94.
Loc. Java, *Dr. Horsfield.*

Glossanthus, *Klein in Wall. List*, No. 6394.

Char. Gen. *Calyx* 5-fidus, tubo 5-gono angulis marginatis, laciniis parùm inæqualibus; æstivatione valvata. *Corolla* personata; labium superius abbreviatum bilobum; inferius indivisum (lobis lateralibus abortientibus). *Stamina* antherifera 4 inclusa, antheris in coronulam cohærentibus. *Stigma* indivisum. *Ovarium* disco completo cinctum. *Capsula* calyce inclusa, bivalvis, placentis utrinque seminiferis.

Herbæ *alternifoliæ, glabriusculæ; foliis integris basi hinc altè excisis; racemis secundis.*

1. *Glossanthus malabarica*, Klein in Wall. List, No. 6394. Benth. Scrophul. Ind. p. 57.
2. *Glossanthus Notoniana.*
Wulfenia Notoniana, *Wall. Tent. Flor. Nepal.* p. 46; *List*, n. 409.
3. *Glossanthus Zeylanica.*
4. *Glossanthus Mexicana*, R. Br.
Klugia azurea, *Schlecht. in Linn.* 8, p. 248.

Monophyllæa.

Char. Gen. *Calyx* 5-partitus, laciniis ovatis; æstivatione imbricata. *Corolla* bilabiata: labio superiore bilobo; inferiore trilobo. *Stamina* antherifera 4, antherarum loculis divergentibus. *Ovarium* disco dimidiato basi instructum. *Stigma* indivisum? *Capsula* calyce tecta, ruptilis? semibilocularis.

Herba *glabra.* Folium *unicum caulem simplicissimum terminans, sessile, costatum, integrum;* racemi *corymbosi, subseriati, ex ipsa basi folii.*

Monophyllæa Horsfieldii.
Loc. Sumatra, *Dr. Horsfield.*

Platystemma, *Wall. Pl. Asiat.*, 2, p. 42, t. 151.

Char. Gen. *Calyx* altè 5-fidus; æstivatione valvata. *Corolla* tubo brevissimo, limbo bilabiato patenti: labio superiore bilobo; inferiore trifido. *Stamina* antherifera 4, exserta, antherarum loculis divergentibus. *Ovarium* disco annulari basi cinctum, placentis utrinque ovuliferis. *Stigma* indivisum. *Capsula*? . . . .

Herba *pubescens; caule simplicissimo terminato folio unico inciso-crenato, quandoque cum altero nano stipuliformi; racemo terminali unico paucifloro.*

Rhabdothamnus, *Cunningh. in Ann. Nat. Hist.*, 1, p. 460.

Char. Gen. *Calyx* altè 5-fidus. *Corolla* tubo campanulato, limbo bilabiato. *Stamina* antherifera 4, exserta, antheris in coronulam cohærentibus, loculis divaricatis. *Stigma* . . . . *Capsula* demùm 4-valvis placentis utrinque seminiferis. *Semina* albuminosa.

Frutex *ramosissimus oppositifolius.*

Rhabdothamnus Solandri, Cunningh., l. c.
Loc. Nova Zelandia, 1769, *J. Banks & D. Solander*, 1826, *Cunningham.*

FIELDIA, *Cunningh. in Field's Mem. N. S. Wales*, p. 363.

CHAR. GEN. *Calyx* 5-partitus. *Corolla* tubulosa. *Stamina* antherifera 4, antherarum loculis parallelis. *Stigma* bilobum. *Bacca* subexsucca.

Suffrutex *oppositifolius.*

Fieldia australis, *Cunningh. l. c.* p. 364, *cum tab.*

RHYNCHOTHECUM, *Blume, Bijdr.*, p. 775.

Corysanthera, *Wall. List, No.* 6411.

CHAR. GEN. *Calyx* 5-partitus. *Corolla* bilabiata, tubo brevi. *Stamina* antherifera 4, inclusa; *antheræ*, loculis confluentibus, bivalves, valvula interiore minore. *Bacca* calyce cincta.

Suffrutices *oppositifolii, fasciculis paniculisve axillaribus.*

CENTRONIA, *Blume, Bijdr.*, p. 776.

CHAR. GEN. *Calyx* spathaceus, hinc fissus. *Corolla* infundibuliformis, limbo bilabiato patenti. *Stamina* antherifera 4 inclusa; antheræ uniloculares, dorso ad basin calcaratæ, liberæ. *Stigma* capitatum. *Bacca* siliquæformis; placentæ carnosæ, lobis revolutis seminiferis.

Herba *cárnosa in radicibus arborum parasitica aphylla; scapis squamatis.*

Obs. Character ex D. Blume qui ad hanc familiam retulit plantam *Æginetiæ* forsan affiniorem.

Centronia mirabilis, Blume Bijdr., p. 777.

CYRTANDRA, *Forst. gen.*, *t.* 3.

Getonia, *Banks et Soland. MSS.*

CHAR. GEN. *Calyx* 5-fidus. *Corolla* infundibuliformis, bilabiata. *Stamina* antherifera 42, inclusa, antherarum loculis parallelis. *Stigma* bilobum. *Bacca* placentis revolutis undique seminiferis.

WHITIA, *Blume, Bijdr.*, p. 774.

CHAR. GEN. *Calyx* 5-partitus. *Corolla* infundibuliformis, bilabiata. *Stamina* antherifera 2 semiexserta, antherarum loculis haud parallelis. *Stigma* infundibuliforme. *Bacca* siliquæformis.

Frutices (*Javanicæ*) *radicantes; foliis oppositis integerrimis inæqualibus inæquilateris; inflorescentia axillari fasciculata.*

Obs. Character a D. Blume.

R. Br.



HORSFIELDIA ACULEATA.

TAB. XXVI.

HORSFIELDIA, *Bl. Bijdr.*, p. 885. Schubertia, *Bl. l. c.*

CHAR. GEN. *Involucrum* capituli polyphyllum, imbricatum. *Calycis margo* obsoletus. *Petala* æqualia, acuta, æstivatione valvata. *Fructus* subovatus, hispidus, evittatus; commissurâ parùm angustatâ; mericarpiis dorso 3-costatis.

Frutex *procerus, aculeatus.* Folia *ad apices ramorum conferta, maxima, peltata, palmata, subtùs pilis stellatis intricato-lanata.* Panicula *terminalis, ramosissima.* Capitula *numerosissima, subsessilia, in ramulis ultimis spicatìm disposita.* Flores *minuti, brevissimè pedicellati; pedicellis 2-bracteatis.*

HORSFIELDIA *aculeata,* Bl. MS. in Bijdr., p. 885.

Schubertia aculeata, *Bl. olim in l. c.*

DESCR. Frutex magnus (ex Horsfieldio subarborescens). Caulis teres, sulcatus, aculeis brevibus aduncis armatus, intùs cavus, cavitate medullâ cellulosâ levissimâ farctâ. Rami paritèr aculeati, basi nudi, apice foliiferi. Folia in apicibus ramorum conferta, maxima, sesquipedalia, peltata, circumscriptione subrotunda, palmata; lobis 7—10 ultra medium fissis, inferioribus brevioribus, subovatis, acutè inciso-serratis, incisuris denticulatis; suprà viridia, glabra; subtùs densissimè albido-lanata, nervis fuscescentibus tantùm exceptis. Pili singuli e basi simplici rectiusculâ in ramos substellatos crispato-intricatos abeuntes. Petioli foliis longiores, teretes, infernè aculeati læves, supernè albido-lanati. Panicula terminalis, maxima, 4-pedalis, rachi (cum ramis ramulisque ejus) tereti, sulcatâ, albido-lanatâ. Rami paniculæ inferiores subtensi foliis parùm mutatis 5—3-lobis, vel quandoque integris, in petiolos lanatos 1—2-pollicares insidentibus, minimè peltatis, lobis acutis denticulatis; cæterùm in utrâque facie ramorum foliis simillimis. Ramuli paniculæ ultimi 6—9-pollicares, undique ferè ad basin usque capitula numerosissima, parùm remota, subsessilia, vel brevissimè tantùm pedicellata, singulis bracteâ parvâ ovatâ subtensis, gerentes. Capitula magnitudine pisi minoris, involucrati; involucri foliolis 10—12, imbricatis, membranaceis, exterioribus ovatis plurinerviis, interioribus ovato-linearibus, trinerviis, ciliatis. Flores in quovis capitulo numerosi, 12—20,

minimi, brevissimè stipitati; singuli in imâ stipitis basi bracteolis duabus minutis, membranaceis, 1-nervibus, ciliatis, alterâ (exteriore) lineari-subspathulatâ, alterâ minore lineari, instructi. Calyx totus adnatus, pilis setosis hispidus, margine obsoletissimo. Petala 5, æqualia, minima, æstivatione valvata, ovata, acuta, apice parùm concava, citò caduca. Stamina 5, libera, cum petalis caduca; filamentis exsertis, petalis plùs duplò longioribus, filiformibus; antheris minutis, subrotundis, bilocularibus, rimâ longitudinali dehiscentibus, polline minutissimo lævi subsphærico repletis. Discus epigynus majusculus, nudus. Styli 2, ad basin usque distincti, filiformes, stigmate parvo capitati, sub anthesin petalorum longitudine recti, post anthesin completam persistentes divaricati. Fructus parvus, ovatus, siccus, bipartibilis, sub-paleaceo-setosus, setis inferioribus deflexis, pedicellum cæteroquin nudum undique occultantibus, superioribus ascendentibus. Mericarpia singula dorso 3-costata, costis parùm elevatis, evittata (vel saltem in fructu vix maturo vittis inconspicuis), semiovata, ad commissuram planam latiusculam vix contracta; carpopodiis mericarpiis suis solutis adnatis. Semen ex apice loculi pendulum, demùm cum pericarpio accretum, oblongo-subcylindricum, albuminosum, hilo puncto nigrescente notato. Embryo minutissimus; radiculâ parvâ hilum spectante; cotyledonibus ovali-subrotundis plano-convexis.

The genus *Horsfieldia*, dedicated by Dr. Blume to the excellent naturalist through whose means I have now the opportunity of publishing its full description, is one of the four genera of *Umbelliferæ*, which M. DeCandolle, in his Memoir on that family*, states that he had never examined. To *Umbelliferæ* it unquestionably belongs, but it is, perhaps, the most anomalous plant comprised within its limits. It is said by Dr. Blume to be "Eryngio nimis affine"; and this presumed affinity no doubt depended, in the mind of the author, on its capitate inflorescence, and the subtension of each of its flowers by bracteæ assuming in some degree the appearance of paleæ seated on a common receptacle. But the great difference in the mode of arrangement of these bracteæ, and the entire absence of calycine segments, of paleaceous squamulæ on the fruit, and of the remarkable lacinulæ or appendices to the petals, which are all so characteristic of *Eryngium*, would at once furnish technical characters for its separation, even if its habit allowed of an approximation to that genus. In this respect, however, as well as in most others, no two genera of the family can be more strikingly distinct.

But if *Horsfieldia* be removed from the neighbourhood of *Eryngium*, next to which M. DeCandolle†, in conformity with Dr. Blume's observation, has placed it, to what other position in the family should it be referred? This is a question by no means easy to answer. In merely technical characters it verges between M. DeCandolle's tribes of *Hydrocotyleæ* and *Saniculeæ*, its fruit being hardly sufficiently compressed laterally to entitle it to a place in the former, while at the same time it exceeds in the comparative depth of its carpella from before backwards most of the genera of the latter. Both tribes, however, are so little natural in their composition that it is impossible to regard them as definitively settled. *Hydrocotyle* and *Astrotricha* in the one, and *Sanicula* and *Eryngium* in the other, are surely too widely different from each other to admit of their being placed together in tribes so closely restricted; and the principles of arrangement which necessitate so discordant a union must still be regarded as in some degree imperfect, notwithstanding the frequency with which, in other instances, they lead to the formation of truly natural groups.

So far as I am aware, there is no known genus of *Umbelliferæ* with which *Horsfieldia* can be regarded as intimately allied. In its fruticose and almost arborescent habit, the prickles of its stem and branches, its panicled inflorescence with spiked capitula, and the valvate æstivation of its corolla, it offers a manifest approach to many of the plants composing the family of *Araliaceæ*, to which indeed, on a casual inspection, it would most probably be

* p. 21, note.

† *Prodromus*, tom. iv., p. 87.

referred. But in all the truly differential characters of the two families it is essentially an *Umbellifera,* having a dry fruit, surmounted by two distinct styles, and separating at maturity into two single-seeded carpella, the walls of which cohere with the membranes of the seed. The slight line of demarcation between the two families is perhaps in some degree broken in upon by this remarkable addition to the numerous approaches that subsist between them : it is still, however, sufficiently well marked for practical purposes; and *Horsfieldia* may be regarded as adding only an additional link to the connexion between two families, which, as Mr. Brown long since observed*, "belong at least to the same natural class."

A far more important difference than any of those just mentioned is indeed implied in the character of *Araliaceæ* given by Professor Don†, who describes the seeds as "erecta; *testa exterior* crustacea; *interior* membranacea"; and this description has been adopted by M. DeCandolle‡. But no such wide deviation from the structure of *Umbelliferæ* really exists. The mistake has no doubt originated from considering the crustaceous endocarp of the cells of the fruit as the testa of the seed; but the point of attachment of the unimpregnated ovulum, the internal structure of the seeds themselves, and the obvious characters of the fruit, all afford sufficient evidence that this view is wholly untenable. The seeds of *Araliaceæ* are in fact, like those of *Umbelliferæ,* pendulous from the summit of the inner angle of the cells in which they are contained; a distinct raphe passes along their internal edge from the place of their attachment to the lower extremity of the seed, where the outer and inner coats (both of a membranous texture, and closely adherent throughout) are marked by a small but obvious chalaza; and the radicle of the embryo, as might be inferred from this arrangement of parts, is placed at the upper extremity of the seed in close proximity with the hilum. A moment's reflexion will suffice to shew that if the crustaceous endocarp were to be regarded as the testa, and the actual point of attachment of the seed as the chalaza (no notice being taken of the true chalaza, and of the raphe connecting it with the vessels of the placenta), the radicle, in conformity with the law ascertained by Mr. Brown§, would be found at the opposite extremity of the seed, and consequently at the part corresponding with the base of the cell. It is not, however, in this case necessary to have recourse to any such process of reasoning, the entire structure of the fruit and seed manifestly proving, as their intimate connexion with *Umbelliferæ* would lead us to expect, that the seeds of *Araliaceæ* are truly pendulous. It should be observed that Professor Lindley‖ has correctly described the attachment of the ovula and seeds of this family, but without noticing the texture of the coats of the latter; and that Dr. Bartling¶, while truly describing the seeds as "inversa," adds "testa pericarpio adhærente crustacea," thus explaining the source of the original mistake, and continuing it in a more explicit form.

The inflorescence of *Horsfieldia* is altogether anomalous: its compound panicle with spiked capitula is without a parallel, so far as I am aware, among *Umbelliferæ.* Several *Araliaceæ* offer an approximation in the compound nature of their inflorescence, but in none of these plants are the umbellulæ reduced so distinctly to the form of capitula, and their mode of bracteation is altogether different. The bracteæ of *Horsfieldia,* two in number to each flower, (sometimes arising in the form of paleæ from the common receptacle, but more frequently adherent to the base of the very short pedicel, and separating with it from the common head) bear little resemblance to those which singly subtend the bases of the pedicels in the allied genera, and assume according to their position the form of involucra or involucella. The general involucrum of the capitulum is also remarkable on account of the close imbrication of its leaflets, which have no evident relation to the included flowers.

The corolla in its æstivation is distinctly valvate. M. DeCandolle** quotes the authority of Mr. Brown for the observation that *Umbelliferæ* differ from *Araliaceæ* by the imbricated æstivation of the petals, which are valvate in

* Flinders's Narrative, &c., vol. ii. p. 557.

† *Prodromus Floræ Nepalensis,* p. 186.

‡ *Prodromus,* tom. iv. p. 251.

§ King's Narrative, &c., vol. ii. p. 546.

‖ Introduction to the Natural System of Botany, p. 4.

¶ *Ordines Naturales Plantarum,* p. 237.

** *Mémoire sur les Ombellifères,* p. 7.

the latter; and cites *Trachymene* as the only positive instance of a valvate corolla among the former. But the petals of this genus are in truth more or less imbricated, the degree of imbrication varying in the different species; while on the other hand, the corolla of *Astrotricha*, mentioned by M. DeCandolle as approaching to valvate, appears to me to be much more nearly so disposed than that of any other Umbelliferous genus with the single exception of *Horsfieldia*. These slight modifications, however, occurring as they do in genera placed on the very limits of the order, and in the most remarkable instance forming an obvious link of connection between *Umbelliferæ* and *Araliaceæ*, can scarcely be regarded as in any degree affecting the value of the character derived from so important a point of structure.

A few words may be added with reference to the nomenclature of the genus. It was originally dedicated by Dr. Blume to M. Schubert; but the name first given was subsequently altered by the author, in a MS. correction, to *Horsfieldia*, and the latter has since been adopted by M. DeCandolle. The motive for this alteration was the discovery that no less than two genera had been previously named in honour of M. Schubert, while Dr. Blume had himself (following up an observation of Mr. Brown*) been the innocent instrument in depriving Dr. Horsfield of the genus in which Willdenow had intended to commemorate his name. Of the two *Schubertiæ*, the earliest, founded on the *Cupressus disticha* of Linnæus, was characterized by M. de Mirbel† in 1812; but the same plant had already been formed into a genus by M. Richard‡, under the name of *Taxodium*, first published in 1810. The second *Schubertia*, an Ascelpiadeous genus established by Professor Von Martius§, has, however, distinctly the priority of Dr. Blume's, having been published in 1824, while the latter was only made known in 1826. The genus *Horsfieldia* of Willdenow having been determined to be a genuine species of *Myristica*, the application of that name to the present genus was no less an act of justice than the payment of a well-earned compliment.

Horsfieldia aculeata is, according to Dr. Horsfield's Notes, the "*Gorang-ireng* of the Javanese. It was found first in 1814 in the Province of Banyumas under the native princes of Java (westward of the capital of Surokerto) about 3000 feet above the level of the ocean. I observed it also in 1817 in the Mountain Gede, southward of Batavia. According to my observation it does not occur in many localities. The stem in some cases is nearly arborescent, rising to a considerable height." The single habitat given by Dr. Blume is the Mountain Tjerimai in the Province of Cheribon. I. J. B.

TAB. XXVI. *Fig.* 1. The upper part of the stem of *Horsfieldia aculeata*, much reduced. *Fig.* 2. A single branch of the panicle, of the natural size. *Fig.* 3. A leaf, one half of the natural size. *Fig.* 4. A leaf, subtending one of the branches of the panicle, of the natural size. *Fig.* 5. One of the capitula, in an advanced state, slightly magnified. *Fig.* 6. The same, less advanced. *Fig.* 7. A flower, magnified. *Fig.* 8. The same with its petals and stamina removed, to shew the pistillum. *Fig.* 9. The fruit, in a more advanced state. *Fig.* 10. One of the mericarpia, separate. *Fig.* 11. The two mericarpia separated, with the setæ removed to show the costæ. *Fig.* 12. One of the outer bracteæ. *Fig.* 13. One of the inner bracteæ; all magnified.

---

* *Prodromus Flor. Nov. Holl.* p. 400.

† *Bulletin de la Société Philomatique,* 1812, p. 123.

‡ *Annales du Muséum*, tom. xvi. p. 298.

§ *Nova Genera et Species Plant. Brasil.*, i. p. 55, t. 33.



TRISTANIA OBOVATA.

TRISTANIA OBOVATA.

TAB. XXVII.

TRISTANIA, *R. Br.*

CHAR. GEN. *Staminum phalanges* 5, petalis oppositæ iisdemque vix longiores. *Antheræ* incumbentes. *Capsula* 3-locularis polysperma (semiexserta v. inclusa et) connata calycis tubo turbinato pedicellato (in pedunculo communi). *R. Br. in Hort. Kew. ed.* 2, *tom. iv. p.* 417.

Arbores *vel* frutices. Folia *latiuscula, paginis dissimilibus, alterna, opposita vel conferta.* Flores *minùs conspicui, axillares; pedunculis ramosis cymosis vel corymbosis; pedicellis plerumque ternis.*

TRISTANIA *obovata,* foliis alternis obovatis glaberrimis, ramulis calycibusque glabris, staminum phalangibus 3—4-andris, capsulis semisuperis.

DESCR. Arbor, ramis ramulisque cortice ferrugineo-rubente rugosiusculo obductis; ligno pallidè rufescenti, tenaci, duro. Folia sparsa, crassa, coriacea, brevè petiolata, obovata, basi in petiolum attenuata, apice quandoque subretusa, integerrima, glaberrima; suprà lucida, venis parùm prominentibus; infrà nervo medio prominente, venis primariis marginalique anastomosanti prominulis; inconspicuè glanduloso-pellucido-punctata, glandulis minutis inæqualibus. Corymbi numerosi, axillares, cymosi, pedunculati, pedunculo pollicari, ramificationibus brevibus, dichotomis. Flores brevissimè pedicellati, bini vel terni, pedicellis divaricatis. Calyx persistens, 5-fidus; tubo turbinato; lobis brevibus, in æstivatione subimbricatis, ineunte florescentiâ subrotundo-ovatis, obtusis, peractâ marginibus inflexis dentes parvos acutos distantes simulantibus. Petala 5, æstivatione imbricata, inter lobos calycis, in annulo summæ ejus faucis inserta, lobos calycinos paulò superantia, subrotunda, margine subdenticulata, caduca. Stamina 15—20, in phalanges 5 petalis oppositas, 3—4-andras, cum petalis in fauce calycis insertas, disposita; filamentis basi brevè connatis, extimo in axi petali reliquis longiore petalum subæquante, lateralibus duobus brevioribus, quarto intimo (dum exstat) brevissimo; omnibus in æstivatione versùs apicem inflexis. Antheræ brevè ovales, biloculares, incumbentes, connectivo brevissimè ultra loculos producto. Pollen minutum, hyalinum, trigonum, angulis rotundatis prominentibus. Ovarium parvum, sericeum, subrotundo-ovatum, in fundo calycis sessile, basi cum illo connatum, 3-loculare, loculis polyspermis.

Ovula numerosissima, transversìm centrifuga, placentæ fungosæ majusculæ e summo loculi angulo interno pendulæ affixa, mutuâ pressione angulata. Stylus simplex, subulatus, stigmate acutiusculo terminatus. Capsula oblongo-ovalis, basi styli persistente mucronulata, glabra, imâ tantùm basi cum calyce concreta, sed in parte ejus tertiâ ab illo arctè obtecta, cæterùm exserta, trilocularis, e laminis duabus composita, exteriore scilicet membranaceâ, interiore cartilagineâ, nitidâ; septis completis, e laminâ tantùm interiore plicatâ, in duas facilè secedente, ortis. Semina (vix matura) quoque loculo 8—12, e summo angulo interno ope placentæ retractæ et nunc processum brevissimum efformantis, suspensa, collateralia, plerumque æqualia, loculi longitudine, vel quandoque superioribus sensìm brevioribus, imbricata, linearia, subpaleacea. Structuram intimam in seminibus immaturis, vel fortè sterilibus, scrutari non licuit.

Tristania obovata is, as far as I am aware, the only species referrible to that genus, that has yet been discovered beyond the limits of New Holland. Its nearest approach among the described species is to *Trist. laurina*, from which, however, it differs most remarkably in the reduced number of its stamina. An attempt has been made by M. Schott* to distinguish two of the species confounded in gardens under the name of *Tristania* from the *Trist. neriifolia*, for which latter he has retained the original generic name, applying to the species separated that of *Lophostemon*; but his knowledge of these plants and of their allies (confined apparently to the three species to which he refers, and not extending even to the fruit of these) was too limited to admit of his framing a satisfactory arrangement. Such an arrangement can only be expected from one who is intimately acquainted with the singularly interesting tribe to which *Tristania* belongs; and as there is reason to hope that it will soon appear, I willingly abstain from further observation on the subject.

I may, however, mention, as a warning to etymologists, that Sir James E. Smith† is entirely mistaken in his derivation of the generic name of *Tristania* from the Greek; and in supposing it to allude "to the ternate disposition of the flowers and their stalks,"—a derivation recently adopted by Professor Lindley‡. It could not have occurred at the moment to either of these writers (although they must both have been well aware of the fact) that M. Jules de Tristan had published, in the early part of the present century, in the "Journal de Physique," and in the "Annales du Muséum d'Histoire Naturelle," memoirs on the development of buds, on the genus *Pinus*, and on the affinities of the genus *Reseda*, each of them affording sufficient evidence of his talent for observation and ingenuity in applying it, to entitle him to the compliment of having his name commemorated in the usual form. The seeking for a Greek derivation in such a case is almost as amusing as the whimsical mystification of Du Petit Thouars§, who professed to derive the name of the genus *Thuarea* (or as he prefers calling it *Microthuareia*) from a Greek compound signifying "little grass."

Tristania obovata is, according to Dr. Horsfield's Notes, "a native of the Island of Banca, where it is named Palavan. Its stem is arboreous, erect with several inconsiderable curves in the ascent, knotty; often twisted spirally, appearing as if force had been applied to the tree when young; and spotted. Its bark is of a yellowish or reddish-brown colour, separating in very large irregular scales, often two or three feet long and several inches wide, leaving the stem exposed of a yellow or whitish colour, and accumulating in heaps near the root. The branches spread but little; and the lesser branches and twigs are straight, round and smooth, three or four often arising from one knot in an irregular whorl. Three varieties are noticed by the inhabitants of Banca and distinguished by the names of *Palavan toongouw*, *Palavan toodak* and *Palavan poopoor*. The wood is hard

* *Wiener Zeitschrift für Kunst, Literatur und Mode*, 1830, vol. iii. p. 772: as quoted in *Linnæa*, 1831, *Literatur-bericht*, p. 54.

† *Encyclopædia Britannica*, in voce *Tristania*.

‡ Botanical Register, fol. 1839.

§ *Genera Nova Madagascariensia*, p. 3.

and knotty and yields excellent coals on being burnt, but is unfit for timber. The coals are much used in the tin furnaces. It is found in all parts of Banca, near the Ocean." I. J. B.

Tab. XXVII. *Fig.* 1. A branch of *Tristania obovata,* of the natural size. *Fig.* 2. A flower, magnified. *Fig.* 3. The same, laid open on one side. *Fig.* 4. One of the petals separate, with its stamina. *Fig.* 5. A single stamen. *Fig.* 6. A capsule, with its calyx. *Fig.* 7. A transverse section of the same. *Fig.* 8. The same removed from the calyx, which is seen separate at *Fig.* 9, showing the extent of the attachment subsisting between them. *Fig.* 10. A vertical section of the same. *Fig.* 11. The seeds removed from one of its cells. All magnified.

EUONYMUS JAVANICUS, *Blume.*

TAB. XXVIII.

EUONYMUS *Javanicus*, foliis oppositis ovalibus apice obsoletè crenatis glabris, pedunculis 1-floris fasciculatis, floribus pentandris; petalis fimbriatis, capsulis acutè pentagonis.

Euonymus Javanicus, *Bl. Bijdr.*, p. 1146.

DESCR. Arbor mediocris. Ramuli cortice cinereo-virescenti obducti, glaberrimi, teretiusculi; novelli angulato-sulcati, glaucescentes. Folia opposita, 4—6 pollices longa, $1\frac{1}{2}$—2 pollices lata, elliptica, basi apiceque subæqualitèr acutiuscula, basin versùs submarginato-integerrima, apice obsoletè denticulato-crenata, utrinque glaberrima, minutè lacunoso-pellucido-punctata, coriacea; suprà glauca, nervo medio venisque primariis vix prominulis; infrà lucidiuscula, nervo medio magis prominente. Petioli ferè semi-pollicares, crassiusculi, parùm glandulosi, suprà latè canaliculati. Pedunculi simplices, basi subarticulati, pollicares, glabri, striati, apice sub floribus incrassati, fasciculati vel quandoque solitarii, axillares, vel ex apicibus ramulorum inter par ultimum foliorum terminales. Calyx 5-partitus, glaber, æstivatione imbricativâ in alabastro subgloboso; laciniis subrotundato-obtusis, flore aperto reflexis. Petala 5, laciniis calycinis alterna, iisque duplò longiora, æstivatione similitèr imbricativâ, aperta dissitè patentia, oblonga, obtusa, ciliato-fimbriata. Stamina 5, petalis alterna, disco ovarium cingenti inserta, distantia; filamentis longitudine ferè petalorum, subulatis, basi paulùm dilatatis; antheris medio dorso affixis, bilocularibus, loculis ovatis brevibus infernè divaricatis. Pollen parvum, globosum, læve. Ovarium 5-loculare, in disco magno carnoso immersum, subrotundo-ovatum, stylo brevi subulato mucronatum. Stigma simplex, ovato-conicum, stylo vix crassius. Ovula in quovis loculo bina, adscendentia, superposita, ope funiculi brevis crassiusculi angulo loculi interno affixa; inferiore (an semper?) post fecundationem abortiente; superiore inter maturationem arillo ex apice funiculi orto sensìm induto. Capsula crassa, coriaceo-sublignosa, magnitudine nucis avellanæ, obovata, styli basi persistente mucronata, 5-angularis, angulis acutis quandoque brevissimè alatis dehiscens, 5-locularis; valvis externè planiusculis, glabris, internè nitidis, medio septiferis. Semen in quovis loculo (an semper?) unicum (ex icone ovatum, arillatum, arillo rugosiusculo; albumen seminis formâ, copiosum; cotyledones planæ, ferè æquè ac semen latæ, ovatæ, in albuminis medio; radicula brevis, hilum spectans.)

Euonymus Javanicus belongs to that section of the genus in which the seeds continue to retain their original



EUONYMUS JAVANICUS.

position with reference to the placenta, and do not, as in certain other species to which Mr. Brown* has referred, become reversed during the progress of their growth. In these species the raphe is external; but the mode of its displacement, originating as it does in the resupination of the seeds, evidently tends, as Mr. Brown has observed, to confirm rather than to invalidate the general rule that the raphe properly belongs to that side of the ovulum which is next to the placenta. Exceptions to this rule unquestionably occur, and Mr. Brown† has himself pointed out a very remarkable one in the true *Caprifoliaceæ*; but M. Adolphe Brongniart‡ states them to be frequent, and instances the families of *Rhamneæ* and *Ilicinæ*. In the latter family, in the genus *Rhamnus* in its most limited signification, and in *Berchemia*, he describes the raphe as external, while in all the other *Rhamneæ* it is lateral; and these positions he evidently regards as being in conformity with the original direction of the ovules. But a close examination of these ovules in their young state will be found to confirm the general rule no less distinctly than the observation of the change which takes place in the resupinated species of *Euonymus*, by showing that they also undergo a change of position, effected in a different manner, but productive of a nearly similar result.

In all the ovula of the family of *Rhamneæ* which I have examined in their young state, I have uniformly found the raphe at that period distinctly internal; but with their advancing growth it is gradually carried outwards by a greater or less degree of lateral torsion in the funiculus by which the ovulum is attached. In none is this change of position more evident than in the species of true *Rhamnus*, in which the eversion finally becomes most complete. Of this *Rh. catharticus* affords a ready and decisive instance; but *Rh. crenulatus* is perhaps still more conclusive, in consequence of its seed sometimes retaining its original position unchanged, with the raphe (which is seated in a broader and more superficial sulcus than is usual in the genus) directed towards the placenta, even at its full maturity. More commonly, however, the raphe in this species becomes more or less lateral, and in a few instances it is found entirely everted; these changes of position, when they do occur, being accompanied with an evident twist of the very short funiculus. I may add that *Rh. alpinus* also furnishes a good example of the same disposition; and that this species is a true *Rhamnus*, as referred by M. DeCandolle, and not a *Frangula*, as arranged (probably through inadvertence) by M. Brongniart. In the genus *Frangula*, which it is surprising that botanists should persist in regarding only as a section of *Rhamnus*, the internal position of the raphe in the young ovulum is equally manifest; and the subsequent lateral displacement is as evidently due to a twist in the funiculus. *Berchemia lineata* (the only species of that genus which I have examined) has the raphe of the young ovulum equally internal; and I have observed the same original position of the ovulum and the same subsequent torsion of its funiculus, rendering the raphe either lateral or more rarely wholly external, in several species of *Ilex* and *Prinos*. For these reasons, and as I have never met with an example of the contrary where I had sufficient materials to determine the point with exactness, I am disposed to believe that this disposition prevails throughout both the families referred to, and that the exception furnished by them consists not in the original position of their raphe, but in its subsequent displacement. The object of this displacement it is difficult to conjecture.

The close affinity indicated by Mr. Brown§ between *Celastrinæ* and *Hippocraticeæ* is now so generally admitted that it is unnecessary to do more than refer to it: it may, however, deserve notice that in outward habit the present plant bears so great a resemblance to some species of *Hippocraticeæ*, that on a superficial examination it might be referred with equal probability to the latter family as to that to which it really belongs.

Euonymus Javanicus is stated by Dr. Horsfield to be the "*Jalen* of the Javanese." "I found it," he says, "abundantly in the medial parts of Java on the hills south of Soerakarta, and on those of Pajittan and Prowoto, in a fertile soil, about 500 feet above the sea. It is a tree of middling size, the largest diameter of the stem rarely exceeding nine inches. Many branches are sent off near the ground, which spread regularly in all directions and

* In King's Narrative, App. 2, p. 549.

† In Wallich's *Plantæ Asiaticæ*, 1, p. 15.

‡ In *Annales des Sciences Naturelles*, x. p. 325, &c.

§ In Tuckey's Narrative, App. p. 427.

are subdivided into numerous, smooth, round, straight branches, the extreme branchlets being slightly bent downwards. I noticed it first in 1809." I. J. B.

TAB. XXVIII. *Fig.* 1. A branch of *Euonymus Javanicus*, of the natural size. *Fig.* 2. An unopened bud, showing the æstivation of the calyx. *Fig.* 3. An expanded flower. *Fig.* 4. One of the petals, separate. *Fig.* 5. A flower, with the petals removed, more highly magnified, showing the disk and insertion of the stamina. *Fig.* 6. A transverse section of the disk and ovarium. *Fig.* 7. A longitudinal section of the same. All magnified. *Fig.* 8. An opened and an unexpanded capsule, of the natural size. *Fig.* 9. A seed, inclosed in its arillus. *Fig.* 10. A longitudinal section of the same. *Fig.* 11. A transverse section.

Tab. XXIII



STYLODISCUS TRIFOLIATUS.

STYLODISCUS TRIFOLIATUS.

TAB. XXIX

STYLODISCUS.

CHAR. GEN. *Flores* diclines (dioici ?), æstivatione valvati. *Masculi: Calyx* 5-phyllus, foliolis concavis. *Corolla* nulla. *Stamina* 5, æqualia; filamentis columnæ centrali usque ad medium adnatis; antheris intra calycis foliola nidulantibus. *Rudimentum pistilli* discus stipitatus obsoletè 5-lobus. *Flores feminei: Calyx* 5-partitus. *Glandulæ* 5, calycis foliolis oppositæ. *Ovarium* 3-loculare, loculis 2-ovulatis. *Styli* 3, simplices. *Pericarpium* baccatum.
Arbor *magna.* Folia *sparsa, stipulata, petiolata,* 3- *vel* 5-*foliolata; foliolis articulatis, stipellulatis, petiolulatis.* Flores *parvi, numerosissimi, in paniculis axillaribus.*

STYLODISCUS *trifoliatus.*

Andrachne trifoliata, *Roxb. Fl. Ind.*, 3, p. 728.

DESCR. Arbor. Ramuli crassitie pennæ anserinæ, cortice cinereo rugoso induti, fistulosi, medullâ copiosâ farcti; novelli (exsiccati) nigri, glabri, angulati. Folia in ramulis novellis sparsa, subfasciculata, cicatrice magnâ decidua, tri- vel rariùs bi- aut quinque-foliolata. Petioli 3—6-pollicares, glabri, sulcati, basi articulatâ stipulis 2—3 lineas longis, lineari-lanceolatis, membranaceis, citò caducis stipati. Petioluli basi articulati, stipellis minimis caducis instructi; laterales breviores, semipollicem vel pollicem longi; terminalis pollicaris vel bipollicaris. Foliola plerumque terna, rariùs quina, rarissimè bina, ovata vel ovalia, acuminata, basi sæpiùs acuta, quandoque obliqua, antrorsùm crenato-serrulata, utrinque glaberrima, supernè lucida, 3—5 pollices longa, 1—2 lata; terminale plerumque majus. Flores masculi et feminei in diversis arboribus. Paniculæ (in quovis ramulo) plures axillares, 4—6-pollicares; axi ramis ramulisque articulatis, glabris. Bracteæ ad ramorum basin citò caducæ, ex cicatricibus tantùm in exemplaribus mihi obviis notandæ; ramulorum et pedicellorum persistentes, parvæ, membranaceæ, ovato-lanceolatæ. Flores masculi parvi, numerosi, pedicellis brevibus lineam vel duas lineas longis suffulti. Alabastrum depressum, 5-lobatum, æstivatione valvatâ. Calyx 5-phyllus, foliolis subrotundis, concavis, glabris. Corolla

squamulæve omninò nullæ. Stamina 5, foliolis calycinis opposita; filamentis brevissimis crassiusculis columnæ centrali circa medium affixis. Antheræ subrotundo-reniformes, biloculares, marginibus longitudinalitèr dehiscentes, basi emarginatâ affixæ, intra cavitates foliolorum calycis nidulantes. Pollen minutum, læve, subsphæricum, copiosum. Pistilli rudimentum columna centralis brevis, crassa, coronata disco peltato, orbiculari, v. obsoletè 5-lobato, lobis foliolis calycinis respondentibus, in æstivatione versus florescentiam florem tanquam operculo claudente. Flores feminei paritèr pedicellati et bracteati; juniores mihi non nisi ex icone Roxburghianâ noti. (Ex. icone laudatâ calyx ferè ad basin 5-partitus, glaber, laciniis ovatis, acutis; glandulæ (staminum rudimenta ?) 5, parvæ, luteolæ, subrotundæ, emarginatæ, sessiles, laciniis calycinis oppositæ; ovarium subrotundo-ovatum, stylis tribus recurvis coronatum.) Post calycis lapsum styli persistentes, elongati; ovarium 3-loculare, loculis biovulatis, ovulis ex apice anguli interioris loculorum pendulis. Paniculæ fructiferæ pendulæ. Pericarpium indehiscens, baccatum, magnitudine cerasi minoris, subsphæricum, stylorum reliquiis 3-mucronulatum; epicarpio crasso, coriaceo; endocarpio crustaceo, lævi, facilè in tres coccos medio longitudinalitèr dehiscentes separabili. Semina in quoque loculo bina, collateralia, ab apice anguli interioris pendula, obovata, extùs convexa, intùs axin versus acutangula, castanea, lucida. Testa bilamellosa, laminâ exteriore tenui, membranaceâ, interiore fibroso-crustaceâ. Chalaza hilo obversa, magna, fungosa. Membrana interna tenuis, membranacea. Albumen oleosum, semini conforme, copiosum. Radicula cylindrica, exserta, hilum spectans; cotyledones planæ, subrotundæ, amplitudine ferè albuminis; plumula inconspicua.

The characters of this remarkable genus of *Euphorbiaceæ* are so peculiar, that I confess myself unable to point out its immediate relations in that extensive family. From *Andrachne*, to which the only known species was referred by Roxburgh, it differs in so many essential particulars, that it is needless to enter into a comparison between them. Adopting M. Adrien de Jussieu's arrangement of *Euphorbiaceæ*, its technical characters would indicate its place in the second section, to which Professor Bartling has since given the name of *Phyllantheæ*; but, as far as I am acquainted with the genera which compose that tribe, there are none among them with which it can be brought into close approximation: Its immediate position must therefore be left for future inquiry. The compound leaves, which constitute the most striking peculiarity in its habit, although very uncommon in the family, occur at least in four other genera belonging to it, viz. in *Hevea*, *Anda*, and some species of *Tragia* and *Dalechampia*. All these genera, however, are as widely distinct from *Stylodiscus* as most of them are from each other.

It is curious that neither Dr. Horsfield's collection nor the numerous specimens in the Indian Herbarium of the Linnean Society furnish examples of the female in its flowering state, for which it has therefore been necessary to have recourse to Roxburgh's drawing in the collection of the East India Company. In this drawing a few female flowers are represented as scattered over the male panicle, and it would appear from Roxburgh's description that such a circumstance is of frequent occurrence, inasmuch as he places the genus in the class *Monœcia*, and speaks of the male flowers as "sometimes on a separate tree, sometimes on the same." In the numerous male panicles that I have examined I have not been able to detect a single female flower.

The species appears to occupy a wide range, specimens in Dr. Wallich's collection having been brought from various parts of both the Indian Peninsulas, including Nepaul, the neighbourhood of Madras and Ava. From Dr. Horsfield's notes I learn that it is the *Gintungan* of the Javanese: he found it "in the eastern parts of Java, first in Malang in 1806, and subsequently in Blitan, east of Kediri, in 1815. Its stem is arboreous, large and erect; its branches spreading towards the extremity and dichotomous; and it casts its old leaves and produces new at the flowering season in August." It is mentioned as a simple astringent among the new medicines noticed

by Dr. Horsfield in his "Short Account of the Medicinal Plants of Java"*; and is stated by Sir Stamford Raffles† to be employed for masts and spars of small vessels, and to have both wood and bark of a red colour.

I. J. B.

Tab. XXIX. *Fig.* 1. A branch of *Stylodiscus trifoliatus*, bearing male flowers, of the natural size. *Fig.* 2. A portion of a branch, bearing female flowers, in an advanced state. *Fig.* 3. A male flower, seen from above, magnified. *Fig.* 4. A section of the same, with the calyx removed, showing the insertion of the stamina, and the disk of the rudimentary pistillum. *Fig.* 5. One of the leaves of the calyx, separate. *Fig.* 6. A stamen, separate. *Fig.* 7. A female flower, copied from Dr. Roxburgh's drawing, in the collection of the East India Company. *Fig.* 8. A transverse section of the ovarium, somewhat advanced. *Fig.* 9. A transverse section of the fruit. *Fig.* 10. A seed, seen from within. *Fig.* 11. The same, seen from without. All magnified.

---

* Transactions of the Batavian Society, vol. viii. p. 127, 1.

† History of Java, vol. i. p. 40.

DIALIUM INDUM, *L.*

TAB. XXX.

DIALIUM, *L. Mant.*, p. 3. Arouna, *Aubl. Guian.* p. 16.

CHAR. GEN. *Calyx* 5-partitus, laciniis deciduis. *Corolla* nulla. *Stamina* 2, calycis laciniis posterioribus opposita. *Ovarium* biovulatum ; stipite (brevissimo) libero. *Stylus* incurvatus. *Stigma* simplex. *Legumen* indehiscens, sæpissimè monospermum. *Albumen* crassum, corneum. *Cotyledones* foliaceæ.

Arbores. Folia *pinnata cum impari, foliolis paucis alternis.* Bracteæ *parvæ, solitariæ, caducæ, pedicellos subtendentes.* Flores *paniculati, parvi.*

DIALIUM *Indum,* foliolis oblongo-ovalibus acuminatis, alabastris ovalibus, antheris oblongis filamenta multotiès superantibus.

Carandje, *Bont. Hist. Ind. Orient.*, p. 93. *Rumph. Amb.*, 2, p. 93.
Tamarindus monococcus minor, &c., *Pluken. ! Mant.*, p. 177. *Ejusd. Amalth.*, p. 198, t. 441, f. 4, fruct.
Dialium Indum, *L. ! Mant.*, pp. 24 et 511. *Afzel. ! Gen. Pl. Guin.*, p. 11. *Smith ! in Rees' Cycl.*
Dialium Javanicum, *Burm. Fl. Ind.*, p. 12.

DESCR. Arbor. Ramuli crassitie pennæ anserinæ, albido-cinerascentes, rugosi. Folia alterna, (ex cicatricibus) stipulata, pinnata cum impari; petiolo communi tripollicari, basi glandulosâ; foliolis alternis 5—7, brevitèr glanduloso-petiolulatis, stipellis (in speciminibus mihi obviis delapsis) verosimilitèr instructis, ovali-oblongis, basi acutis, apice acuminatis, integerrimis, 3 vel 4 pollices longis, unum latis, suprà colore saturatiore glaberrimis lucidis, infrà pallidioribus glabris, nervo medio prominente instructis. Paniculæ ramulorum terminales, simpliciusculæ, ramis parùm basin versus divisis, angulato-sulcatis, albido-sericeis, fructiferis demùm lævigatis, cinerascentibus. Pedicelli breves subterni, basi bracteolâ caducâ (ex cicatricibus relictis) verosimilitèr stipati. Alabastra elliptica. Calyx albido-sericeus, ferè ad basin 5-partitus, laciniis caducis, circiter lineam longis, subæqualibus, ovali-oblongis ; æstivatione imbricativâ quincunciali, laciniâ anteriore scilicet externâ, posterioribus mutuò et laterales imbricantibus. Petala nulla. Filamenta 2, laciniis calycis posterioribus opposita, brevia, crassa, antheras oblongas, 2-loculares, longitudinaliter dehiscentes, prope

Tab. XXX.



DIALIUM INDUM

basin affixas, gerentia. Ovarium parvum, glabriusculum, obliquè ovato-lanceolatum, anticè convexum, basi contractiusculâ subsessile, in stylum ejusdem ferè longitudinis inter antherarum apices incurvatum desinens. Stigma obtusiusculum. Ovula 2, subovata, funiculis brevibus affixa, obliquè pendula. Legumen suborbiculare, lateribus compressum, styli basi persistente breviter apiculatum, evalve, indehiscens, constans e tribus laminis; quarum exterior densa, crustacea, fragilis, nigrescens, pilis sericeis albidis sub lente tantùm conspicuis vestita; intermedia e parenchymate pulposo, laxè celluloso, ruberrimo, acidulo, in sicco friabili; intima tenuis, papyracea. Semen solitarium, obovato-quadratum vel subrotundum, basi prope hilum acutiusculum, apice (in regione chalazæ) retusum, saturatè badium, lucidum, lineolis impressis tenuissimis numerosis e basi seminis ortis chalazam versus convergentibus, ramulis anastomosantibus connexis, minutè insculptum; post macerationem punctis elevatis ex epidermide in particulis pellucidis desquamante scabriusculum. Testæ lamina exterior coriacea, densa; interior granulosa, e cellulis laxè cohærentibus. Membrana interna tenuis, testæ laminæ interiori adhærens, eique ad apicem connexa ope chalazæ majusculæ, hilo oppositæ, chordam vascularem raphen conspicuam efformantem terminantis, albumen vel membranam albuminosam subjacentem arctè includens. Albumen (seu potiùs membrana nuclei propria albuminis vicem gerens) corneum, corculo duplò crassius, omninò continuum et imperforatum, in ambitu attenuatum, præsertim versus raphen et radiculam. Radicula hilo proxima, recta, subrotunda, breviter apiculata; plumula parva, acuta, diphylla; cotyledones albuminis fere amplitudine, sed tenuiores, subrotundæ, foliaceæ, virescentes.

Descriptio florum ex specimine Linneano.

For the earliest notice of this tree we are indebted to Bontius, who in his "Historia Naturalis et Medica Indiæ Orientalis," published by Piso in 1658, p. 93, 94, describes it as a second species of Tamarind, called *Carandje* by the Malays, differing considerably from the common kind in its fruit, but closely agreeing with it in leaves. This very erroneous description as regards the leaves is accompanied by an equally gross error of synonymy, doubtless originating in the similarity of the names, in quoting the *Carandas* of Garcias ab Horto, *Carissa Carandas* of Linnæus, for the same plant. The fruit is, however, to be recognised in the following description, as well as in the otherwise execrable figure: "Fructus maturi nucleis tanquam nuces inclusi, singuli singulis, secùs ac Tamarindis, quæ, ut Fabæ, plura semina, et Pisa, profert. Colore hic fructus est aperto nucleo aureo; quem *Orange* nostrates vocant, et caro ejus exterior gratissimi est saporis, neque dentes tam acidos reddit quam Tamarindorum pulpa, sed de dulci sapore participat."

In the second volume of his "Historia Plantarum," published in 1688, p. 1749, Ray intimates his suspicion of the incorrectness of the union of the two plants, in the following terms: "Nisi ipse eandem dixisset, aliam arborem existimâssem quam describit Bontius hoc nomine." In his Appendix, p. 1919, having in the meantime seen specimens of the fruit, he adds, "Carandas Bontii alia ab hâc arbor esse videtur, quamvis ille [Bontius] eandem velit, et quidem Tamarindus Americanus nostratum, aut ei simillima arbor. Tamarindi enim illius siliquæ quas apud illustrem virum D. Gul. Courtine vidimus, breves compressæ et monospermæ erant."

Notwithstanding this correction, Plukenet, who had in his possession specimens of the fruit obtained from the same collection, adopts in his "Mantissa," published in 1700, the erroneous synonym, and describes the Coerandje as follows: "Tamarindus monococcus minor, pruniformis, pulpâ intùs ossiculum ambiente, aurantiæ coloris, esculenta. Carandas, *Garciæ, lib.* II., *cap.* 6. Carandje *Malaiis, Bontii, lib.* 6, *cap.* 4, 93. Hujus pulpa propter gratissimum ejus saporem et refrigerandi sanguinis efficaciam, delicatioribus ventriculis valdè expetita est. The *Tamarind-Plumme* nostratibus dicta." In the same place, and in his "Amaltheum," published in 1705, he makes doubtful references to fruits described by Linschoten and Dampier, which are evidently very different; and in

the plates accompanying the latter work gives very imperfect figures of the fruit of the true *Coerandje.* Specimens of this fruit still exist among the Sloanian collections in the British Museum, marked in Plukenet's hand "Tamarind Plum, East Indies: Carandas Garciæ ab Ortu, vid. Almagest. 361.;" and these it appears from Sir Hans Sloane's original Catalogue formed part of Dr. Plukenet's collections, and were obtained by him from Mr. Charleton, a name synonymous with that of Courtine or Courten quoted by Ray. They are in excellent condition, and clearly identify the fruit described by Ray and Plukenet with the true Coerandje of the Malays.

In the second volume of his "Herbarium Amboynense," p. 93, published in 1750, Rumphius corrects the error of Bontius, and describes the Coerandje in the following terms: "Jacobus Bontius, *lib.* 6, *cap.* 4, alteram Tamarindi describit speciem, quam Javanicâ linguâ vocat *Carandje* et quidam *Carandjang*, ac putat, sed malè, esse *Carandas Garziæ, libr.* 2, *cap.* 6, *Arom.* Folia ipsi tribuit vulgari Tamarindo similia; in iis autem, quæ in horto meo plantatæ fuere, & ex Javanico semine propullularunt, diversa ab eo observavi, ac similia inveni Lingoæ foliis, sed paulo angustiora et acutiora, ut et alternata: Ejus autem fructus sunt siliquæ parvæ, in quibus unum tantum continetur ossiculum, non ita amplum, ac circumjectum carne seu pulpâ acidulâ, quæ siccior est quam vulgaris Tamarindi, nec ita nigricat, vel ullam habet vim purgantem, ita ut instar aliorum fructuum comedatur, sive ad sitim sedandam, sive ob saporem et ad oblectamentum." It is singular, that Burmann, the editor and Latin translator of this work, in subsequently resorting to it for the Coerandje, should have passed over this very clear description, although unaccompanied by a figure, and have referred to the figure of a plant which has hardly the most distant superficial resemblance to it.

The first dried specimens of the plant brought to Europe seem to have found their way into Burmann's collection, by whom they were probably communicated to Linnæus, who described them in his "Mantissa," p. 3 and p. 24, published in 1767, under the name of *Dialium Indum,* quoting for them no synonym, and giving their habitat as India generally. In the next year appeared a second description, in some of its parts nearly identical, but somewhat fuller, in the "Flora Indica" of the younger Burmann, p. 12, under the name of *Dialium Javanicum,* with a reference to the Javanese synonym of *Coerandje,* an indication of the more precise habitat of Java, and an erroneous quotation of the "Cortex papetarius, *Rumph. Amb.* 3, p. 212, t. 137, quæ differt foliis serratis." It differs, he might have added, in every essential particular. Burmann's own synonym, and his quotation of that of Rumphius, were adopted by Linnæus in 1771, in the "Mantissæ prioris Additamenta," appended to his "Mantissa altera."

In 1774, Houttuyn* described and figured, from a drawing communicated to him by the elder Burmann, a plant which he regarded as a second species of *Dialium,* and to which he gave the specific name of *Coromandelicum.* It is difficult to determine what this plant really is; but it has evidently no relation to the genus in question, and has consequently been rejected from it by all later systematists.

The Linnean character of the genus, as given in the "Mantissa," ascribes to it no calyx and a pentapetalous corolla, and the same view of the nature of the perianthium was adopted by Burmann: neither of them had seen the fruit, which Linnæus only suspected to be a legumen. It is therefore by no means surprising, that Solander, who had probably never seen the original *Dialium,* should in his MSS. have described a very nearly related plant, brought from Sierra Leone by Smeathman, and furnished with an evident rudimentary petal in addition to its calyx of five divisions, as a new genus, without any direct reference to *Dialium,* although he indicates for it, in the Linnean system, the exact position given to *Dialium* in the 13th edition of the "Systema Vegetabilium." This is the *Codarium* of Solander's MSS., under which name it was subsequently taken up from them by Vahl and Afzelius.

Specimens of this plant, collected by Isert in Guinea, were described and figured by Willdenow†, in 1796, as a new species of *Dialium;* and it is remarkable that this approximation of two really allied plants should have been the result of a similar error in regard to the structure of both, Willdenow as well as Linnæus mistaking the calyx

---

* *Natuurlyke Historie,* 2 Deel, 2 Stuk, p. 39.

† Rœmer, *Archiv für die Botanik,* Th. 1, p. 30, t. 6.

for a corolla. In this he was less excusable than his master, inasmuch as he overlooked the rudiment of a petal actually existing in his plant, and contrived, probably by some awkwardness of manipulation in the expansion of the flower, to give a strong but inaccurate confirmation of the correctness of his view of the nature of the parts, by representing, both in his figure and description, the odd segment as posterior and emarginate, instead of exhibiting it, as it truly is, anterior and entire. This last mistake might, however, easily have occurred in an imperfectly macerated flower: I have myself seen in a flower removed from the water after an immersion of only a few minutes one of the two posterior segments so much twisted from its natural position as apparently to occupy the middle place; and a slight degree of pressure is sufficient, under the same circumstances, to produce a splitting of the apex and a consequent appearance of emargination. In one respect, it may be added, Willdenow was even less advanced than Linnæus; for, although in possession of the ripe fruit, he describes it as a capsule: its true analogy did not escape Solander, who characterized it as a legumen, and referred the plant to the natural order of *Lomentaceæ*, near *Hæmatoxylon*.

In 1804 Vahl*, as before observed, published the genus *Codarium*, adopted from Solander's MSS., quoting the *Dialium Guineense* of Willdenow as a synonym for Smeathman's plant, the *Codarium nitidum* of Solander, describing with Solander the calyx as pentaphyllous, noticing the small rudimentary petal overlooked by Willdenow, and declaring it, in opposition to Willdenow, to be "genus a Dialio omnino distinctum." Besides the specimens from Smeathman in the Banksian Herbarium, he had seen others in Thonning's collection, of which a description is given by Thonning himself. It is probably on the authority of the latter, who describes the seed as "unicum, raro duo, tria," that the legumenis said in the generic character to be "sub trispermum"; an assertion for which it is difficult to account as regards the larger number mentioned, the ovules appearing to be uniformly two, not only in *Codarium* but in *Dialium* also.

To the genus *Dialium*, for which he adopts the Linnean character, Vahl† adds the *Arouna Guianensis* of Aublet‡, which he appears to have seen in Richard's Herbarium, and of which he gives a description chiefly remarkable for the circumstance, that having adopted, in the preceding page, from Solander the term *calyx* for the *perianthium pentaphyllum* of *Codarium*, he rejects Aublet's *calyx 5-partitus*, and applies the expression *corolla pentapetala* to the obviously analogous organ in the *Arouna*; and thus establishes, as Willdenow had done in the former case, the relationship of his plant to the original *Dialium*, which he too had never seen, on a repetition of the same error.

In the same year appeared, in the form of an academical dissertation, the first part of Afzelius's "Genera Plantarum Guineensium," which contains§ a copious and accurate account of the genus *Codarium*, with the addition of a second species from the Banksian Herbarium, and a comparison of its characters with those of *Dialium Indum*, of which he had seen and examined the Linnean specimen. This examination led him to reject the term *corolla* applied to the perianthium of *Dialium* by Linnæus, and to substitute that of *calyx*: it led also to the conclusion that the differences in the structure of the two plants were so considerable "ut consultius duxerimus eas in duo genera potiùs separare quam in unum conjungere, præsertim quamdiù illius [Dialii] fructus ignoratur, qui si vel pro legumine sumeretur, qualem reverà eum esse credimus, nihilominùs quod ad internam structuram totus latet. Sed qualiscunque ille est, diversa tamen calycis conformatio, atque filamentorum affixio abunde indicant, ad divisionem inter *Lomentaceas* aliam, quam cui est inserenda nostra, pertinere plantam Linneanam‖." In common with Vahl, whose work, being nearly contemporaneous with his own memoir, he had not seen, he refers the *Dialium Guineense* of Willdenow, notwithstanding the discrepancies in the figure and description, which he concludes to be the result of an imperfect examination of dried specimens, to the genus *Codarium*, and to his *Codarium acutifolium*, the same with the *Codarium nitidum* of Solander and Vahl. Of this species he had pre-

---

* *Enumeratio Plantarum*. tom. i. p. 302. † l. c. p. 303. ‡ *Histoire des Plantes de la Guiane*, tom. i. p. 16, t. 5.
§ p. 13. An abstract of this valuable Memoir is given in Schrader's Neues Journal, Band 2, p. 233, &c. ‖ l. c.

viously given a brief notice* under the name of the *Velvet Tamarind*, by which it is known to the English colonists on the West coast of Africa; and he adds in the present memoir a full and elaborate description taken from specimens collected by himself and compared with those of the Banksian Herbarium. His second species was described by him from the same collection, and is founded on specimens gathered by Hove at Suconda near Cape Coast: to this he gives the name of *Codarium obtusifolium*. "Locus hujus generis," he observes, "ut ex hactenùs dictis facilè colligi potest, in Systemate *Artificiali* erit juxta *Dialium* et *Arunam*, sed in *Naturali* inter plantas Leguminosas ct præcipuè Lomentaceas eas, quibus tubus calycis est persistens, ejusque lateri adnatus germinis pedicellus, quales sunt *Jonesia, Tamarindus, Afzelia, Cyclas, Schotia, Brownea*, &c. Sed ab eis differt eo, quod ad basin tubi calycini nullæ adsunt bracteæ, calycem exteriorem mentientes. Ideoque ad distinctam potiùs sectionem cum multis aliis referendum putetur. Enimverò conformatione fructûs cum *Tamarindo* omnium optimè congruit†." To this valuable dissertation I shall again have occasion to refer.

In 1819, Sir James Edward Smith‡ gave a new description of the genus *Dialium*, taken from the original specimen in the Linnean Herbarium; in which he adopted the correction of *calyx* in lieu of *corolla* made by Afzelius. He follows Vahl in referring the *Arouna* of Aublet to the same genus, and further modifies the Linnean character by describing the pericarp as a "legume internally pulpy, with one or two compressed seeds;" a character evidently taken from Aublet's description of the *Arouna*, the ripe fruit of *Dialium Indum* being still, as he states, unknown. In this latter plant Sir James Smith describes a gland at the base of the *germen*, and asks, "Can the apparent gland, hitherto unnoticed, which we have found in *D. Indum*, be the rudiment of a petal? If so, it brings this species very near to *Codarium*."

In Mr. Sabine's Account of the Edible Fruits of Sierra Leone observed by Mr. George Don, published in 1824§, mention is made of *Velvet* and *Brown Tamarinds*; the trees bearing them are popularly described; and it is conjectured that the latter, which had also found a place in Afzelius's Report, are merely a variety of the former.

M. De Candolle‖ adopted, in 1825, the union proposed by Vahl of the *Arouna* of Aublet with the *Dialium* of Linnæus, both of which he had seen in the Herbarium of Baron Delessert, the specimens of the latter being those of Burmann, from which the Linnean seem to have been derived. He adopted also the genus *Codarium* of Solander, with the following note: "Genus ut præcedens [Dialium] affine Detarieis ob legumen subpulposum, a Leguminosis esset alienum, si semina, ut descripsit Afzelius, albumine vero donata." Under this genus he enumerates the *Codarium acutifolium* of Afzelius, of which he had seen a specimen without fruit, the *Cod. obtusifolium* of the same author; and a third species, described as new, *Cod. discolor*, of which he had also seen a specimen without fruit, collected in Guinea by Smeathman, the diagnosis of which, taken only from the leaves, contains nothing which is not strictly applicable to the young leaves of *Codarium nitidum*, brought from the same locality by the same collector.

In 1832, in a memoir on certain of Aublet's genera, M. Kunth¶ describes *Arouna* as very different from the group containing *Outea, Vouapa*, and *Parivoa*, and more nearly related to *Ceratonia, Copaifera, Codarium* and other apetalous genera. He objects to the union of *Dialium* and *Arouna*, of the former of which he had examined a single very imperfect flower; but the only difference to which he alludes consists in the form of the anthers, very long in *Dialium*, short and broad in *Arouna*. In the latter he describes the ovarium as sessile and biovulate, seated in the middle of an adnate disk, beneath the margins of which the two stamina are inserted; and

* See his "Account of the Natural Productions of Sierra Leone," published as an Appendix to the "Report of the Court of Directors of the Sierra Leone Company, 1794," p. 171.

† *Genera Plantarum Guineensium*, p. 22–23.

‡ Rees's Cyclopædia, Article Dialium.

§ Transactions of the Horticultural Society, vol. v. p. 460.

‖ *Prodromus Systematis Naturalis Regni Vegetabilis*, tom. ii. p. 520.

¶ *Abhandlungen der K. Akademie der Wissenschaften zu Berlin, aus dem Jahre* 1832. *Erste Theil*, 1834, p. 48—50.

compares it with *Codarium*, which he states to agree with it in most essential particulars, but to differ especially in the absence of the disk, in its stipitate ovarium, and in having three stamina, the intermediate of which (sterile and scalelike) had previously been mistaken for a petal. He gives, however, no reason for regarding it as a stamen; and its functional value appears so unimportant that it matters little whether it be considered as a barren stamen or a rudimentary petal. Still its total want of resemblance to the filaments of the fertile stamina; its flattened form; the veining of its expanded portion, rendered evident by transmitted light; and, above all, its point of attachment, which is decidedly external to that of the fertile stamina, leave little doubt that it is the representative of one of the missing petals—of that, namely, which in the Papilionaceous division of the family constitutes the vexillum, and which, in several genera of *Cæsalpineæ*, is alone retained, while all the others are wanting.

Finally, in the same year, Messrs. Guillemin and Perrottet* combine all the three genera, *Dialium*, *Arouna*, and *Codarium*, under the first-mentioned name; and regard the *C. acutifolium* and *C. obtusifolium* of Afzelius as the same species. They describe the rudimentary petal of this species as most frequently, if not constantly, wanting in the lateral flowers of the ultimate branches of the inflorescence; but I must confess that I have not myself met with a single instance of the absence of this organ. In M. De Caisne's excellent analysis of the parts of fructification, a plan of the flower is given, in which two lateral bracteæ appear to be indicated; but these are not noticed in the description, neither do they occur in the other figures: they certainly have no existence in nature.

It may be added, that in his Commentary on the Second Book of the Herbarium Amboynense†, Dr. Buchanan Hamilton, overlooking, in common with all systematic writers, the indication afforded by the Malay synonym of *Coerandje* quoted by Burmann under *Dialium*, says of the *Carandje* of Plukenet and Rumphius: "This is a fruit of which I know nothing, nor do I find it mentioned in any modern book."

From this historical summary it will be seen that plants brought from three distant quarters of the globe, and originally regarded as furnishing the types of three distinct genera, have been all successively referred to the single genus *Dialium*. It will also be evident that the fruit of the original *Dialium*, having remained altogether unknown to modern writers, although described by Bontius, Ray, Plukenet, and Rumphius; and that of the Guiana plant being only imperfectly described, it has hitherto been impossible to determine, otherwise than on conjectural grounds, either the natural position or the limits of the genus or genera in question. I trust that this deficiency has been supplied as regards the fruit of the former, by the foregoing description and the accompanying plate: as regards the latter, it may not be superfluous to add a description of the plant taken from an Aubletian specimen in the Banksian Herbarium, and to append some account of a fruit in the same collection, without any indication of name or locality, but which, notwithstanding the uncertainty of its origin, I have no hesitation, both from Aublet's figure, and from its close affinity with that of *Dialium Indum*, in referring to the *Arouna Guianensis*.

Arbor. Ramuli albido-cinerei, rugosi, lenticellis plurimis verrucosi, crassitie pennæ anserinæ; novelli ferruginei, juniores pube molli velutini. Folia alterna, impari-pinnata, stipulata (stipulis in speciminibus delapsis); petiolo communi 5-pollicari, ferrugineo-velutino, basi glanduloso; foliolis 6—9 alternis, breviter glanduloso-petiolulatis (stipellis ab Aubletio descriptis et delineatis, a Vahlio et Candollio tamen denegatis, si quæ adfuerint, delapsis), ovatis, acuminatis, basi infernè subobliquis, integerrimis, reticulatim elevato-venosis, utrinque glabris, uncias 2 longis, 1 latis. Paniculæ ramulos plerùmque terminantes ferrugineo-velutinæ, compositæ, ramis alternis divaricatim horizontalibus, inferioribus 6-pollicaribus, ramulis di-trichotomis, pedicellis sub-trifloris, floribus lateralibus subsessilibus, singulo bracteâ parvâ, ovatâ, caducâ (ut et paniculæ ramuli), subtenso. Alabastra ovata, ferrugi-

* *Flore de Sénégambie*, 1, p. 267, t. 59.

† Transactions of the Wernerian Society, vol. vi. p. 314.

nea, æstivatione quincunciali imbricativâ, lacinii scalycinis 5, inferiore exteriore, duabus posterioribus laterales imbricantibus. Calycis tubo brevi cyathiformi persistenti, limbi laciniis 5 deciduis ovatis. Petala nulla. Stamina 2, laciniis calycis posterioribus opposita, filamentis brevibus crassis, juxta faucem tubi calycis insertis, antheris ovato-subrotundis, bilocularibus, breviter uncinulatim pilosis. Ovarium basi contractâ subsessile, in fundo calycis sub staminibus anticè insertum, obliquè ovatum, velutinum, stylo ejusdem fere longitudinis, apice incurvato, stigmate obtusiusculo. Ovula 2 subrotunda, funiculis brevibus centrifuga.

Legumen hùc sine dubio relatum (quamvis sine loci indicatione vel aliâ quâvis), siccum, drupaceum, indehiscens, obliquè obovatum, stipitatum, cum stipite ferè pollicare, anticè lineâ parum elevatâ, posticè striâ impressâ notatum, e laminis tribus formatum; quarum exterior glabra, ferruginea vel cinerascens, crustacea, fragilis, intermedia laxe cellulosa, levissima, fungosa, intima tenuissimè papyracea. Semen unicum, obliquè subtriquetro-obovatum, in regione chalazæ hilo oppositæ truncato-retusum, funiculo umbilicali brevi e summâ suturâ pendulum, saturatè badium, lucidum, lineolis impressis minutis e basi ortis, chalazam versus convergentibus, hic illic ramulis anastomosantibus connexis, exaratum. Testa e laminis duabus, exteriore coriaceâ, durissimâ, interiore laxè cellulosâ. Membrana interior tenuis, testæ adhærens ope chalazæ majusculæ depressæ e raphe vasculari per testæ laminam interiorem ductâ. Albumen (vel membrana nuclei propria albuminis vicem gerens), plus quam dimidium seminis replens, epidermide tenuissimâ vestitum, cujus ope membranæ seminis internæ in regione chalazæ adnatum, nullibi perforatum, sed marginibus, præcipuè versus raphen, ad radiculam et juxta chalazam, in pelliculæ tenuis consistentiam attenuatum. Cotyledones subrotundo-ovatæ, planæ, foliaceæ, virescentes, albuminis ferè amplitudine, sed minùs crassæ; radicula subsphærica, tota prominula; plumula parva, acuta, apice leviter bifida.

A comparison of this description with that of *Dialium Indum* above given will show that in all essential points of structure the most perfect agreement exists between the Javanese and the Guiana plants; and that Vahl was consequently right, when guided by conjecture rather than by observation (for he had never seen the Indian species), he united the two under one generic name,—a union very properly maintained by subsequent botanists.

The distinction between *Dialium* and *Codarium* is, however, a point deserving more particular consideration. It is by no means so strongly marked as to justify Vahl's expression "genus omninò distinctum," although in technical characters the line of demarcation is sufficiently obvious. The description of *Codarium* given by Afzelius is so copious and accurate that it is only necessary to refer to his Memoir (or to the abstract of it contained in Schrader's Neues Journal, the original itself being so scarce as to have escaped the notice of M. DeCandolle); merely adding, that the ovula, as in *Dialium*, are two in number in both the species which I have examined, and observing that the structure of the seed, although described by Afzelius in somewhat different terms from those which I have adopted, is in reality essentially the same, the apertures in the albumen described by him as actual perforations in the coat of the embryo so called, being, as in the case of the Indian and American plants, merely such an attenuation of its substance as to reduce it to the texture of a thin pellicle, thinnest on the side corresponding with the raphe, but everywhere else sufficiently obvious after the maceration of the seed. The natural dehiscence of the fruit, which seems to be indicated in his generic character, is, it may be observed, as little obvious in the dried specimens presented by him to the Banksian Herbarium as in the fruits of the two species of *Dialium*. His distinctions between the two genera are given in opposite columns, and may very properly serve as the groundwork of the remarks which I have to offer on the subject; they are as follows:—

"*Planta Linneana.*	*Planta nostra.*
Calyx pentaphyllus, ut videtur deciduus.	*Calyx* monophyllus, 5-laciniatus, tubo persistente, laciniis deciduis.
Corolla omninò nulla.	*Corolla* monopetala caduca.
Filamenta e receptaculo plano villoso intra germen enata.	*Filamenta* e margine tubi calycis ab utroque petali latere enata.
Germen sessile eidem cum filamentis loco plano insedens. *Stigma* obtusum.	*Germen* pedicellatum. Pedicellus lateri tùbi calycis adnatus. *Stigma* acutum."

Of these differences, the first, dependent on the existence or non-existence of a persistent tubular base to the calyx, is in reality only a question of degree; a short tube actually existing in *Dialium Indum*, and one of equal dimensions with that of *Codarium acutifolium* being present in *D. divaricatum*: no stress therefore can be laid upon this point of structure as a distinguishing mark between them. The single rudimentary petal of *Codarium*, corresponding in its position with the vexillum of *Papilionaceæ*, unquestionably affords a definite character, which might be fairly taken into account if it were desirable to separate the plants on other grounds: it is, however, so minute as to have escaped the notice of Willdenow, and cannot be regarded as exercising any important influence on the economy of the plant. I may add that, in two flowers, I have noticed a still smaller rudiment occupying the place of one of the lateral petals, and accompanied by a manifest alteration in the structure of the anther of the same side, its cavity being partially obliterated, and a fungous excrescence having formed on its connectivum. The third character, founded on the place of attachment of the filaments, is an obvious deduction from the first: there is, however, as I have before observed, even in the Javanese plant, a very short tube to the calyx, from the margin of which the filaments take their origin; and this is still more manifest in the Guiana species, in which the cicatrices of the filaments on the persistent tube occupy, even in the fruit, exactly the same position as in that of *Codarium*. If the expression "germen sessile," applied to the *Dialium*, be meant to imply that the ovary is attached by a broad base, this character is dependent on imperfect observation, the ovary being actually affixed by means of a contracted portion, which becomes in the fruit an evident though very short stipes. This stipes, again, is still more remarkable in the American plant, in the fruit of which it is longer than that of *Codarium acutifolium* itself. The point of attachment, or perhaps I should rather say of detachment, of the stipes certainly differs; that of the Indian and American plants becoming free at or near the bottom of the tube of the calyx, from which it at once emerges, while that of the African plants is attached to one side of the calyx for nearly the whole length of its tube. As regards the last point of distinction noticed in the female organ, a slight change in the terms employed, substituting "Stigma obtusiusculum" and "acutiusculum" for "obtusum" and "acutum," would approach more nearly to the fact, and would show how trifling is the real difference in this particular. M. Kunth* indeed actually describes the stigma of *Codarium* as "obtusum."

If, therefore, the two genera are to be kept distinct, it is obvious that the only characters on which their separation can be founded consist in the rudimentary petal and adherent stipes of *Codarium*. In all other respects, as regards habit, technical characters, and essential structure, there exists the closest agreement between them. The wide difference of locality would certainly afford a strong argument in favour of the separation of the African plant from either of the species of *Dialium* taken alone; but this argument is greatly weakened in its force, if not altogether set aside, by the necessity under which we have found ourselves of retaining the union of the Javanese with the American. On the whole, if I retain the genus *Codarium*, it is more in deference to the authority of Solander and Afzelius, than from a conviction that the distinctive characters, well-defined and explicit as they are, have any real or essential importance.

Another reason for bringing these plants into intimate connexion with each other may be found in the fact, that,

* *Abhandl. Akad. Berl.*, 1832, p. 49.

so far as I am aware, there is no known genus of *Cæsalpineæ* with which they have a close affinity. Professor Afzelius, guided by the character of the adherence of the stipes of the ovarium to the tube of the calyx, arranges *Codarium* along with *Jonesia, Tamarindus, Afzelia, Cyclas, Schotia, Brownea*, &c. In proposing this arrangement, however, he overlooked the circumstance, that, in the very character regarded as of so much importance, there exists between all these genera and *Codarium* an essential difference, the adhesion of the stipes in them taking place on the posterior side of the calyx and corresponding with the suture of the legumen, while in *Codarium* it is anterior and corresponds with the odd segment of the calyx and the outer margin of the fruit. In this respect the structure of *Codarium* is remarkable, standing, as far as I am aware, quite alone, but connected, as will be obvious on reflection, with the order of the reduction of the stamina, which is also the reverse of that which is usual among the *Leguminosæ*. Thus it is usually the posterior stamina (one of which, in the common diadelphous state of *Papilionaceæ* shows so strong a tendency to separate itself from the rest) that are first lost or become abortive when an irregular reduction takes place. Of this the genus *Cassia* and the *Tamarind* furnish obvious instances among *Cæsalpineæ*. Taking the latter as an example in point (it being in fact the genus to which Afzelius regards *Codarium* as the most closely allied), it would be natural to expect that if adhesion should take place between the base of its pod and the tube of its calyx, that adhesion would occur posteriorly, on the side towards which the legumen would be pressed by the development of the anterior stamina, rather than anteriorly in a direction in which it would be impeded by the united base of the filaments, forming a kind of barrier between; and this is found to be actually the case. The three fertile stamina of the Tamarind* correspond with the three

* There are several points in the character of *Tamarindus*, as hitherto given, that require correction. That of M. DeCandolle[a], omitting the fruit, is as follows: "Cal. sepala 5 basi in tubum coalita, supernè libera reflexa, 3 oblonga, 2 inferiora in lobum unicum latius binervosum sæpe apice bidentatum connata. Pet. 3, cum sepalis superioribus alterna, 2 ovata, medio cucullato. Stam. 9—10, 2—3 longiora inter se monadelpha antherifera, 7 brevissima sterilia. Stylus subulatus." My own observations give the following results. The bud is enveloped by two conspicuous caducous lateral bracteæ, inserted on the summit of the pedicellus. The calyx is deeply 4-parted, with a distinct tube, occupying the space between the insertion of the bracteæ and the base of the segments, which in the flowering state are reflected. Of these segments the upper or posterior (and not, as stated in M. DeCandolle's "Prodromus," probably by a typographical error, the lower) is evidently made up of two parts, of the separation of which a slight indication sometimes appears at the apex. The three petals usually described have the form assigned to them by M. DeCandolle, and the upper one is opposed to the upper segment of the calyx, and consequently alternates with the two parts of which that segment is understood to be composed; while the two lateral petals are opposed to the intervals between the upper and the two lateral segments of the calyx. The two lower or anterior petals are represented by two minute setiform processes, which are opposed to the intervals between the lateral and anterior segments of the calyx; and have been regarded by Linnæus as nectarial appendages, and by Jussieu and most subsequent writers as barren filaments. From the mode in which the stamina are described by M. DeCandolle, it would be natural to infer that there are seven sterile filaments, wholly distinct from the two or three longer and fertile ones, which are only, as it would seem, "inter se monadelpha." I have not been able to trace, in any instance, more than four sterile filaments, and these rudiments form an integral part of the monadelphous lamella, the minute tooth-like processes, which are the evidences of their existence, alternating with the free portions of the three fertile filaments. They obviously represent four of the stamina of the inner series; those, namely, which correspond with the anterior and lateral petals; and the three stamina entirely wanting are those which correspond with the upper or posterior petal, and with the broad and double upper segment of the calyx. The stipes of the ovarium adheres by its upper margin to the whole length of the tube of the calyx; and the style, recurved towards the antheræ of the fertile filaments, is not subulate but filiform, and terminated by a thickened stigma.

This character of "stylus subulatus" appears to have originated with Linnæus, who adds to it, in every edition of the "Genera Plantarum," from the first to the fifth inclusive, "stigma simplex." This in the sixth edition he alters into "stigma crassiusculum," adding from Jacquin, what he seems previously to have neglected, that the three fertile filaments are "infernè connata," and noticing for the first time the inferior rudimentary petals as "Nectarium setis duabus sub filamentis sitis." These setæ were also noticed by M. De Jussieu, who was the first to observe the four rudimentary filaments. His character[b]

[a] *Prodromus*, 2, p. 488. [b] *Genera Plantarum*, p. 347.

anterior segments of the calyx; and the stipes of the legumen coheres with the tube of the calyx posteriorly. In *Codarium*, on the contrary, the remaining stamina are opposed to the two posterior segments of the calyx; and the adhesion of the stipes takes place anteriorly. The same relative position of the stamina exists in the two species of *Dialium*, and the only difference is that (perhaps in consequence of the want of the slight additional pressure afforded by the rudimentary petal of *Codarium*) no actual adhesion of the stipes is found to take place in them.

To the genera enumerated by Afzelius as having the stipes of the legumen coherent with the tube of the calyx, may be added *Humboldtia*, *Amherstia**, and some others, as well as that section of the genus *Bauhinia* to which M. DeCandolle has given the name of *Symphyopoda*. All these genera agree in having the stipes coherent posteriorly, and further differ from *Dialium* and *Codarium*, not only in habit, their leaves being abruptly pinnate, but also in the structure of their ovarium, which is uniformly polyspermous; that of the two genera in question being biovulate. They are also for the most part furnished with two large and conspicuous bracteæ on the pedicel of each flower, generally persistent and forming a striking part of the floral character, but sometimes deciduous and consequently not always to be found on dried specimens. This combination of characters evinces a strict affinity, and deserves to be studied with more attention than it has hitherto received.

There still remain one or two points of structure in these plants on which it may be necessary to offer a few words in illustration. The first of these regards the sculpture, or appearance of sculpture, on the surface of the

---

of the male organs perfectly agrees with my own observations, except in regarding the setiform appendages as barren stamina, instead of rudimentary petals; it is as follows: "Staminum filamenta basi tantùm coalita, 3 longa fertilia, 4 minima sterilia fertilibus interposita, 2 setiformia (Nectarium *Linn.*) sterilia priorum vaginæ extùs apposita." A much less clear idea of the fact is conveyed in Lamarck's[a] "stam. filamenta fertilia tria,—infernè connata cum filamentis sterilibus aliquot minimis interpositis;" and a similar obscurity prevails in the definitions of Swartz[b] and Schreber[c], who have added a seventh rudimentary organ, which I have never yet been able to observe; the former describing "filamenta tria fertilia,—a medio ad basin connata,—filamentis 7 sterilibus intermixtis brevissimis;" and the latter "filamenta tria—infernè ad medium usque connata. Fila quinque (rudimenta staminum) cum *filamentis* alternantia et infernè connata, supernè libera, setacea, capitata, brevissima; duo lateralia reliquis inferiora. Setæ duæ, infra filamenta ex calyce ortæ, iisque incumbentes, minimæ." From these authorities, and more especially from Jussieu, Sprengel[d] seems to have compiled his "Stamina tria perfecta, coalita, setis binis stipata: filamenta sterilia quatuor;" and it is probable that his removal of the genus to the class *Diadelphia* depended on a misconception of the structure thus imperfectly described; as another part of his character, in which he describes the calyx as "bilabiatus, quadripartitus, lab. super. trifidum, infer. integrum bidentatum," is evidently founded on what I have suggested to be a typographical error, reversing the position of the parts, in the character given by M. DeCandolle. It is proper that I should add that Desfontaines[e] followed Swartz and Schreber, and preceded M. DeCandolle, in ascribing to the Tamarind "filamenta staminum tria antherifera, septem verò brevissima vix conspicua, antheris destituta, unde filamenta decem."

With these observations, I submit the following corrections in the descriptive character of the genus, as far as regards the flower: in that of the fruit and seeds I have no alteration to make.

TAMARINDUS, *L.*

Calyx bracteis 2 caducis in alabastro obtectus, basi tubulosus, limbo 4-partito reflexo caduco; laciniâ posticâ (e duabus coalitis) latiore, quandoque bidentatâ. *Petala* 3; superius laciniæ calycis posticæ oppositum, lateralia cum eâdem alternantia; setæ binæ minimæ (petalorum anticorum rudimenta) cum laciniâ calycis anticâ alternantes. *Stamina* 7, basi coalita monadelpha; 3 longa fertilia, laciniis calycis tribus anterioribus opposita; 4 minima sterilia dentiformia, cum fertilibus alternantia. *Ovarium* pluriovulatum, stipitatum, stipite tubo calycis posticè accreto. *Stylus* recurvatus, filiformis. *Stigma* crassiusculum.

* Wallich, *Plantæ Asiaticæ Rariores*, i. p. 1, t. 1.

---

[a] *Illustration des Genres*, p. 95. [b] *Observationes Botanicæ*, p. 25. [c] *Genera Plantarum*, N. 1100.
[d] *Genera Plantarum*, No.1762. [e] *Mémoires du Muséum*, iv. p. 248.

seeds—an appearance which has several times been pointed out to me by Mr. Brown as affording strong indications of affinity, and consequently useful characters in a systematic point of view, in many of the genera of *Cæsalpineæ*. It will be observed that I have particularly noticed this character in my descriptions of the Indian and American plants; and it may be remarked that the striking agreement, amounting almost to identity, of the seeds of *Dialium Indum*, *D. divaricatum*, and *Codarium nitidum* in this minute particular, affords a strong confirmation of its importance. The concentric rings of the seeds of *Guilandina*, and of various other genera, differing, however, greatly in the regularity and mode of their arrangement; the single oval ring of each side of the seed in the Tamarind, which is also found to prevail extensively among *Mimoseæ*; the depressed area occupying the same position in the seeds of the vertical-seeded species of *Cassia**, and so strikingly distinguishing them from those of the horizontal-seeded species† (in which it may be observed that the position of the raphe on the flat surface instead of on the edge of the seed, still however remaining inferior, affords another easily appreciable character); the more or less prolonged marginal depression produced by the strophiola of the seeds of *Bauhinia*; and many similar instances, which it would not be difficult to multiply, may suffice to show that the surface of the seeds of this family affords characters capable of being consulted with advantage.

The other remaining consideration relates to the true origin of the corneous mass which, in so many of the genera of this division of *Leguminosæ*, performs the office of albumen, and which I am disposed, for several reasons, to regard as a thickening of the third membrane of the ovulum or proper coat of the nucleus. M. DeCandolle, who admits of no more than two coats in the ovulum, considers the so-called albumen, in those genera in which he has observed it, as occupying the place of the inner of the two, by him called *endopleura*. But the reasons which militate against this view of the subject are obvious from the descriptions of the seeds of our plants given above. A densely coriaceous *testa*, clothed externally with a thin and evanescent epidermis, and internally lined with a loosely cellular substance, through which latter the vascular *raphe* makes its way to the *chalaza* and there expands to connect the *testa* with the smooth and thin but obvious inner membrane, which is also closely coherent at the same point with the very delicate pellicle immediately clothing the albuminous mass, are sufficiently evident after a continued maceration of the seed. The albuminous mass is totally without perforation. Even at its margins, where it is so much attenuated as to present to a casual inspection the appearance of a want of continuity, especially on that which regards the raphe, a careful examination readily detects a continuation of substance, in the form of a thin and delicate membrane, easily indeed obliterated by coarse manipulation; while in that part which corresponds with the projecting radicle of the embryo, not the slightest vestige of a perforation can be traced, when the parts are carefully separated after maceration. The last-mentioned circumstance is equally decisive against the hypothesis that the part in question is a true albumen formed in the ordinary manner‡; and it therefore most probably represents the proper membrane of the nucleus thickened by a deposition of albuminous matter. An examination of the ovulum in its young state and during its progress towards maturity would of course afford the most decisive test of the justice of this opinion; but I have had no opportunity of instituting such an inquiry. It may be added, that the structure of the seeds of *Cassia*, *Gleditschia*, and several other Cæsalpineous genera with albuminous seeds examined with this view, is, in regard to the disposition of their coats, precisely similar to that of the seeds of *Dialium* and *Codarium*.

Dialium Indum, *Kurandji* of the Javanese, is, according to Dr. Horsfield's Notes, "abundant in the districts south of Batavia, especially near Buitenzorg, the country-residence of the governor-general of Java. The fruit is sold in all bazars, and is a favourite condiment among the natives, in consequence of the pleasant acidulous taste of the pulp surrounding the seed." Dr. Horsfield never found it in the eastern districts. I. J. B.

---

* The genus *Senna* of Tournefort and Gærtner.

† The genus *Cassia* of Tournefort and Gærtner, *Cathartocarpus* of Persoon.

‡ See Mr. Brown's Appendix to Capt. King's Narrative, &c., p. 548.

Tab. XXX. *Fig.* 1. A branch of *Dialium Indum*, in fruit, of the natural size. *Fig.* 2. A flowering panicle, from the Linnean Herbarium. *Fig.* 3. The calycine laciniæ removed and magnified. *Fig.* 4. The stamina and pistillum, after the removal of the segments of the calyx. *Fig.* 5. The pistillum, after the removal of the stamina. *Fig.* 6. The same laid open to show the two superposed ovula. *Fig.* 7. One of the stamina, all magnified. *Fig.* 8. A seed, of the natural size. *Fig.* 9. The same, seen sideways. *Fig.* 10. The same, cut longitudinally, to show the embryo. *Fig.* 11. The same, cut transversely, showing the relative proportions of embryo and albumen.

EUCHRESTA HORSFIELDII.

TAB. XXXI.

EUCHRESTA.

CHAR. GEN. *Calyx* campanulatus, basi posticè gibbosus, 5-dentatus, dentibus 2 superioribus minoribus. *Corolla* papilionacea, vexillo lineari sessili, alis carinæque petalis vix coalitis subæqualibus, longiùs unguiculatis. *Stamina* diadelpha, $\frac{1}{9}$. *Ovarium* stipitatum, 2-ovulatum. *Legumen* longè stipitatum, ovale, chartaceum, indehiscens, monospermum. *Semen* pendulum, membranis coalitis ex embryone solutis quasi arillatum. *Cotyledones* crassæ, carnosæ. *Radicula* recta, respectu axeos cotyledonum obliqua, inclusa.

Frutex. Folia *impari-pinnata*, 1—2-*juga*; *foliolis lateralibus suboppositis*. Racemus *terminalis*, *simplicissimus*, *pauciflorus*. Flores *albi*, *majusculi*.

EUCHRESTA *Horsfieldii*.

Andira Horsfieldii, *Lesch. in Ann. Mus.*, tom. xvi. p. 481. t. 12.

DESCR. Frutex parvus. Ramuli crassitie pennæ gallinaceæ, teretiusculi, longitudinaliter rugosi, grisei; novelli angulati, glabri. Folia alterna, patentia, pinnata cum impari; stipulis manifestis (in speciminibus a me visis) nullis. Petioli 6—8-pollicares, angulati, glabri, basi incrassato-glandulosi. Foliola 3 vel 5, rarò ex abortu terminalis 4, lateralia opposita vel subopposita, 3—5-pollicaria, elliptica, basi acuta, apice plerumque acuminata, integerrima, utrinque glabra, lacunoso- (nec glanduloso-) pellucido-punctata. Petiolulus foliolorum lateralium lineam longus, glandulosus; folioli terminalis semipollicaris vel ultra, apice tantùm glandulosus. Stipellulæ haud conspicuæ. Racemus terminalis, simplicissimus, pauciflorus, floriferus 2—4-pollicaris; pedunculo communi pedicellisque brevissimè ferrugineo-velutino-pubescentibus. Pedicelli floriferi 3 vel 4 lineas longi, singuli bracteolâ minutâ, ovato-lanceolatâ, membranaceâ, ad basin suffulti. Calyx pubescens, campanulatus, basi posticè in gibbum rotundatum productus, ore vix ampliato 5-dentato, dentibus obtusiusculis, tribus anterioribus paulò majoribus, duobus posterioribus minùs profundè separatis. Corolla imo calycis tubo inserta, pentapetala, papilionacea. Vexillum intra calycis gibbum enatum, sessile,



EUCHRESTA HORSFIELDII.

versùs apicem parum recurvatum, leviter emarginatum, angusto-lineare. Alæ paulo breviores, unguiculatæ; unguibus longis angustatis; laminis dimidiato-oblongis, apice rotundatis. Carina e petalis duobus vix coalitis, alarum fere longitudine, longiùs tamen unguiculatis; laminis obliquè dimidiato-obovatis. Stamina diadelpha $\frac{1}{9}$, filamentis ex imo calycis tubo intra petalorum ungues ortum ducentibus; posteriore ad basin usque libero; reliquis ultra medium connatis vaginamque superne fissam pistillum foventem efformantibus. Antheræ parvæ, ovales, biloculares. Pollen læve, sphæricum. Ovarium longiùs stipitatum, obliquè et angustè obovatum, biovulatum; ovulis transversis, ope funiculi umbilicalis brevissimi medio affixis. Stylus filiformis, versus axin floris incurvatus, stigmate acuto terminatus. Racemus fructiferus cum ejus pedunculo elongatus, 6—8-pollicaris; pedicelli leguminumque stipites, utrique semi-pollicares, incrassati. Legumen demùm e stipitis apice deciduum, siccum, chartaceum, fragile, indehiscens, oblongum, magnitudine pruni domesticæ sylvestris, in tres laminas solubile; quarum exterior violascenti-nigra, glaberrima, nitida, tenuis; intermedia (post macerationem) fungoso-cellulosa; intima lævigata, tenuissima. Semen solitarium, e suturâ vexillari prope leguminis apicem pendulum, legumini conforme. Testa membranaque seminis interna arctè connatæ in membranam tenuem, lævissimam, bilamellosam, ab embryone (in sicco et maturo saltem) omninò liberam; raphe vasculosâ inter lamellas ab hilo per latus seminis internum usque ad extremitatem ejus inferiorem ductâ, ibique chalazam parvam subrotundam formante. Cotyledones crassæ, carnosæ, plano-convexæ, subæquales, amaræ. Radicula parva, conica, omninò inter cotyledones inclusa, hilum obliquè (respectu cotyledonum axeos) spectans, sed quamvis ex axi earum deflexa minimè curvata. Plumula inconspicua.

The distinction between the Javanese plant above described and the American genus to which it was referred by M. Leschenault is sufficiently obvious. In the genus *Andira*, (if we regard *A. inermis*, Lam., and *A. excelsa* and *A. riparia**, Kunth, as the typical species of the group) the calyx is perfectly equal at the base, and the vexillum broad, roundish, and unguiculated—two characters strongly opposed to those of *Euchresta*. The fruit of *A. excelsa* and *A. riparia* is unknown; but that of *A. inermis* is described by Swartz† as follows: "Legumen pedicellatum, orbiculatum, duriusculum, uniloculare, subbivalve, l. maturum in duas partes facile divisibile. *Semina* 2, 3. Unicum tantum maturescit." And with this description portions of a fruit of that tree, brought from Jamaica by Dr. Wright, and preserved in the Banksian Herbarium, perfectly coincide. Of the original species of the genus, taking Aublet's *Vouacapoua*‡ as a genuine synonym of the "*Andira*, vulgo *Angelyn*" of Piso§, the flowers still remain unknown, but the fruit has been well described by Aublet, through whom the Banksian collection contains specimens, differing still more widely from the fruit of *Euchresta* than the flowers of the latter differ from those of the other species of *Andira*. "Ils sont," says Aublet, "de forme presqu'ovale, étant moins gros et un peu courbés au bout par lequel ils tiennent à la grappe, et l'autre bout est terminé par une pointe obtuse, qui donne naissance au style. Ils sont à peu près de la grosseur d'un œuf de poule. Chaque fruit peut être comparé à une gousse, dont les deux valves s'ouvrent de la pointe à la base. Ces batans, ou valves, avant de se séparer, sont distingués d'un côté par un sillon longitudinal, et de l'autre par une arête saillante. Les batans sont épais, charnes d'abord, ensuite secs dans leur maturité. Ils sont grisâtres, un peu velus en dehors, lisses et roux en dedans. Ils ne renferment qu'une grosse graine de forme ovale, couverte d'une écorce mince et brune. Cette graine est à deux cotyledons, fermes, charnus, blanchâtres et amers." To this description I may add, from the

* *Nov. Gen. et Sp. Pl. Amer.*, 6, p. 302—3.

† *Flora Indiæ Occidentalis*, p. 1256—7.

‡ *Plantes de la Guiane, Suppl.*, p. 9 and 11, t. 373.

§ *Hist. Nat. et Med. Ind. Occid.*, p. 175, fig. 2 inf.

Banksian specimens, that the seed is pendulous, with a broad, depressed, and strongly marked point of attachment near its upper and broader extremity; that the testa and inner membrane form by their cohesion a thick, hard, brittle, smooth, shining, chestnut coat; that the raphe is well marked, and terminates inferiorly at the apex of the seed; that the cotyledons are of a hard and almost ligneous texture; and that the broad cylindrical embryo, directed, as in the Javanese plant, towards the somewhat lateral hilum, and thus placed obliquely with respect to the axis of the cotyledons, is entirely hidden between them and perfectly straight.

These characters agree so well with those assigned by Swartz to the fruit of *Andira inermis* as strongly to confirm the propriety of associating both plants in the same genus; while, on the other hand, they differ so widely, especially as regards the form, texture, and dehiscence of the fruit, and the texture of the coats of the seed, from those of *Euchresta*, as to render the union of the Javanese with the American plants impossible.

M. DeCandolle* doubts whether *Andira* is sufficiently distinct as a genus from *Geoffroya*, with which it has frequently been combined. I have not seen (neither indeed had M. DeCandolle) any specimens of this latter genus, but it appears to me that the descriptions, of the fruit especially, given by Jacquin†, Bonpland‡, and Kunth§, amply justify their separation. These writers concur in describing the fruit of *Geoffroya spinosa* (the original species characterized by Jacquin, and apparently not since observed,) and *G. superba* (one of the two additional plants referred to the genus by MM. Bonpland and Kunth) as a drupe, in form and texture somewhat resembling an almond, with a soft pulpy coat, and a hard indehiscent, woody putamen,—characters which appeared so extraordinary to Jacquin as to induce him to exclaim: "In stirpe Papilionaceâ drupam quis prædicere fuisset ausus? Nisi forte objiciatur mihi, drupam hic enatam esse ex legumine, cujus cortex interior induratus mutatusque mentiatur nucem; adeoque legumen molle dici oportere. Ego verò naturæ præscribere leges, ejusdemque liberum agendi modum torquere ad præconceptam hypothesin nolui: adeoque drupam vocavi fructum pulposum nucem nucleumque continentem." This character equally includes the *Geoffroya Surinamensis* of Bondt‖, as figured and described in his Monograph; and that plant consequently belongs to *Geoffroya*, and not to *Andira*, to which it has been referred by M. DeCandolle, who follows M. Poiret¶ in considering it (as it probably is) merely a variety of *Geoffroya retusa*, Lam. (*Andira retusa*, Kunth.)

Assuming these two last-named plants to belong to the same species, the genus *Andira* will comprehend the first four species enumerated in M. DeCandolle's Prodromus; the fifth will be transferred to *Geoffroya*; and the sixth, to which he very properly affixes a mark of doubt, becomes our *Euchresta***. Of the six species referred in the same work to *Geoffroya*, the first two, *G. spinosa*, Jacq. and *G. superba*, Bonpl., are undoubted; the two following probably belong to it, but in the absence of fruit cannot be regarded as definitively fixed; the fifth, the *Acouroa violacea* of Aublet††, is certainly alien; and the sixth, adopted from M. Poiret, appears to be equally misplaced. As regards the *Acouroa*, I may observe, that both the description and the figure given by Aublet indicate a much nearer affinity to *Pterocarpus*. The legumen is described as "subrotundum, coriaceum, glabrum, concavum, ferrugineum, uniloculare, non dehiscens;" and is said to contain "Semen unicum, compressum." In the French its character is given as follows: "*Capsule* sèche, roussâtre, arrondie, concave d'un côté et convexe de l'autre, elle contient une graine de forme lenticulaire. Cette capsule ne s'ouvre point." In all these particulars there is a manifest approach to the structure of the true *Pterocarpi* (taking *Pt. Draco* as the type); and this approximation is confirmed by specimens from Aublet, in the Banksian Herbarium, unfortunately, however, exhibiting the leaves

* *Prodromus Syst. Nat.*, 2, p. 475.

† *Hist. Stirp. Amer.*, p. 207–8, t. 180, f. 62.

‡ *Plantes Equinoxiales*, 2, p. 70, 71, t. 100.

§ *Nov. Gen. et Spec. Pl. Amer.*, p. 296–7.

‖ *Dissertatio de Cortice Geoffrææ Surinamensis*, Lugd. Bat., 1788.

¶ *Encyclopédie Méthodique*, Suppl.

** Since this article was written (in 1835) large additions have been made to the species of *Andira* by Mr. Bentham (in *Ann. Wien. Mus.*, 2, p. 107–9), chiefly from the collections of Prof. Von Martius in Brazil.

†† *Plantes de la Guiane*, p. 753, t. 301.

only, with very young buds; but from which I have little doubt that *Acouroa* belongs at least to the same section of *Pterocarpus*, with which genus M. de Jussieu* long ago suggested its affinity†.

The three genera *Geoffroya*, *Andira*, and *Euchresta*, although so clearly distinguished, have still, however, much in common. Their habit is essentially the same, although *Euchresta* is but a small shrub, while the American plants are trees, sometimes of large growth. They agree in having pinnate leaves, with usually opposite leaflets, generally few in number, and a terminal odd one; a terminal inflorescence, forming a simple raceme in *Euchresta*, and once compounded in *Geoffroya* and *Andira*; a campanulate calyx, with five short and nearly equal teeth; a papilionaceous corolla, with all the petals of nearly equal length; diadelphous stamina $\frac{1}{9}$; an ovary containing two, or rarely three, ovules; a one-seeded fruit, with the seed pendulous from near the apex of the cell; the testa and inner membrane of the seed closely cohering together, and free from adhesion to the embryo; no albumen; large fleshy cotyledons; a straight radicle, wholly concealed between the cotyledons, and not placed directly in their longitudinal axis, but deflected laterally towards the hilum, and a scarcely visible plumula. In many of these characters they exhibit a close approximation to *Dalbergia* and *Pterocarpus*, with which they were associated by M. De Jussieu‡, and subsequently by M. Bronn§, who were not aware of the essential character, in the straightness of the radicle, by which they are distinguished from those genera. So close indeed is the resemblance of habit and flowers, that it is by nó means easy, without the assistance of the fruit, to distinguish between the two American genera and many plants of M. Bronn's tribe of *Dalbergieæ*.

In constituting his tribe of *Geoffreæ*, M. DeCandolle‖ appears to have been fully aware of the heterogeneous character of the assemblage of genera which he has brought together, in consequence of the union, or supposed union, of a papilionaceous corolla and coherent stamina with a straight embryo. [M. Vogel¶ and Mr. Bentham have very properly discarded this tribe, which as a natural section is altogether untenable.] Of the six genera, besides *Andira* and *Geoffroya*, arranged under it**, two at least, viz. *Voandzeia* and *Brownea*, do not unite the characters on which it is founded. M. DeCandolle had not examined the seeds of the former; but from his figure†† of the germinating plant it would be far more natural to assume that its embryo was curved, as it is in fact, than to find in it a resemblance to *Arachis*. Specimens of the seed in the Banksian Collection brought from Bombay, whither it was carried by the Portuguese from Mozambique, prove that it is furnished with large farinaceous cotyledons and a radicle strongly curved upon their margins—characters which evidently indicate the restoration of the genus to its original position in the neighbourhood of *Amphicarpæa*, with which its habit so obviously associates it‡‡. *Brownea*, on the other hand, no more deserves to be regarded as offering a papilionaceous flower than one half the family of true *Cæsalpineæ*, to which it unquestionably belongs§§, forming part of that remarkable section (characterized by their abruptly pinnated leaves, the two conspicuous bracteæ enveloping the base of their calyx, and the adhesion of the stipes of their pod posteriorly to its persistent tubular base), to which allusion is made in the preceding article.

Of *Perallea* and *Brongniartia* I know nothing but what is to be derived from the figures and descriptions given

---

* *Genera Plantarum*, p. 364.

† Mr. Bentham conjectures (l. c. p. 93 and p. 107) that it is referrible to *Ecastaphyllum*.

‡ *Genera Plantarum*, p. 363. § *De formis Leguminosarum*, p. 134.

‖ *Prodr. Syst. Reg. Veg.*, p. 474, and *Mém. sur la Fam. des Légum.*, p. 454. ¶ *In Linnæa*, 11, p. 381.

** *Prodr.*, l. c. †† *Mem.*, p. 20, f. 106.

‡‡ Mr. Bentham (Linn. Trans., xviii. p. 158) follows M. Ernst Meyer and M. De Caisne in referring this genus back to *Phaseoleæ*.

§§ In the valuable Memoir on *Leguminosæ*, which I have so frequently quoted, Mr. Bentham has referred *Brownea* to *Mimoseæ*, chiefly on account of its plurality of stamina; but surely this one character, irregular in itself, and accompanied with greater irregularities in the floral envelopes, is not sufficient to outweigh the striking points of affinity above suggested.

by M. Kunth*. It is clear, however, from these that they cannot be considered as nearly related to *Geoffroya*, with which they have little in common; and it seems probable that, notwithstanding their straight embryo, they should be referred to a station among the true *Papilionaceæ*, in the tribe of *Phaseoleæ*, with which they agree so remarkably in habit.

The two remaining genera, *Arachis* and *Dipteryx*, throw greater difficulties in the way of any satisfactory arrangement. It is, however, sufficiently obvious that neither of them has a near affinity to *Geoffroya*; nor can the curious coincidence of both possessing the anomalous character among *Leguminosæ* derived from their oleaginous cotyledons† be regarded as of sufficient importance to bring together plants so extremely dissimilar in habit, and in many of their most essential characters. On the whole, it seems preferable, at least as a provisional arrangement, and until their characters and relations shall be better understood, to refer the former, in accordance with M. DeCandolle's query, "embryone prætermisso ad Vicieas Phaseoleasve‡;" and to transfer the latter to the *Cæsalpineæ*, with which, in spite of some peculiarities of structure, it seems best adapted to harmonize§.

Having thus endeavoured to dispose of all the other genera of the tribe, what is to be done with *Geoffroya*, *Andira* and *Euchresta*, the three genera with which we commenced our investigation of it, including that from which its name is derived? I have already alluded to the resemblance in habit and in the structure of their flowers existing between these plants and the tribe of *Dalbergieæ*; and I confess that I cannot find any more appropriate position for them than in the immediate neighbourhood of that tribe, which they appear to me to connect directly with *Cæsalpineæ*. On the fruit of these genera I am inclined to place less reliance, in considering their natural affinities, in consequence of the extent of its variation in passing from one to the other. The seed is undoubtedly of higher importance; and it will be observed, that although the radicle is perfectly straight, it is not, as in all or nearly all the genuine *Cæsalpineæ*, terminal and occupying the line of the longitudinal axis of the cotyledons, but more or less deflected from that line towards the somewhat lateral hilum. In this respect some species both of *Pterocarpus* and *Dalbergia*, were their radicle included instead of exserted, would be found to make a close approximation to the genera in question, there being in these species no curvature but only a certain degree of obliquity in the position of the radicle. It is for this reason, and also on account of their truly Papilionaceous corolla and diadelphous stamina, that I prefer placing them near the *Dalbergieæ*, and consequently among the genuine *Papilionaceæ*, to the more obvious expedient of suffering myself to be induced, by the straightness of their embryo, to overlook every other indication of affinity, and to class them along with the rectembryous family of *Cæsalpineæ*||.

Euchresta Horsfieldii, "*Porono-Jiwa* of the Javanese, is found," according to Dr. Horsfield's notes, "at an elevation of about 3000 feet above the ocean on many of the mountain ridges in the eastern parts of Java, in considerable abundance. The stem is shrubby, in height from three to four feet, declining, and divided into a few slender branches. It grows in forests in a rich black mould, and is much esteemed and sought for by the natives on account of its medicinal properties. The whole plant is penetrated with an intense bitterness, and the seeds are

---

* *Nov. Gen. Pl. Amer.*, 6, p. 365–7, t. 587–9.

† *DeCandolle, Mem. sur la Fam. des Légum.*, p. 455.

‡ The peculiarity in the embryo of *Cicer arietinum*, from which the plant derives its specific name, might induce us to suspect the possibility of the existence of a straight embryo in plants bearing no distant relation to it.—I have left this passage and the note upon it as originally written, but I subscribe without hesitation to the justice of the reasoning on which Mr. Bentham has since established the near relationship of *Arachis* to *Stylosanthes*, and consequently to the tribe of *Hedysareæ* (see Linn. Trans., xviii. p. 156).

§ I may observe, that *Coumarouma*, which M. DeCandolle follows Aublet in describing as having but a single minute tooth forming the lower lip of its calyx, has, as might be expected from analogy, three distinct denticulations.

|| In Mr. Bentham's arrangement *Geoffroya* and *Andira* form (together with *Dipteryx* and a new genus nearly related to it) a section of *Dalbergieæ* characterized by their pendulous seed and straight embryo; and in this arrangement, as far as regards the two former genera, it will be seen that I perfectly coincide.

exposed for sale in the markets by the vendors of native medicines." In his "Account of the Medicinal Plants of Java," published in the eighth volume of the "Transactions of the Batavian Society*," Dr. Horsfield states that it is one of the remedies in which the natives place the most confidence; they employ the seeds as an antidote against any poison that may have been taken into the stomach, exhibiting one of them triturated with water to counteract the effects of the poison: in a large dose it probably acts as an emetic. According to M. Leschenault†, its fruits reduced to powder and mingled with the food are regarded as having the power of preventing numerous diseases, of strengthening the stomach, and of counteracting poison: mixed with lemon-juice and applied to the wound, they are considered an efficacious remedy against the bites of venomous animals. It holds the first rank among medicinal plants in the opinion of the natives; and the fruits are sold for as much as five, or sometimes even ten *sous* of French money each.

I. J. B.

Tab. XXXI. *Fig.* 1. A branch of *Euchresta Horsfieldii*, of the natural size. *Fig.* 2. The calyx separated, magnified. *Fig.* 3. The vexillum. *Fig.* 4. One of the alæ. *Fig.* 5. One of the petals of the carina. *Fig.* 6. The male and female organs. *Fig.* 7. The ovarium laid open. All magnified. *Fig.* 8. The fruit of the natural size. *Fig.* 9. The seed. *Fig.* 10. The same, with the testa partially removed, showing the raphe and chalaza. *Fig.* 11. The embryo, with the cotyledons separated, showing the radicle and its direction.

* p. 123—4.

† *In Annales du Muséum*, xvi. p. 481—2.

MECOPUS NIDULANS.

TAB. XXXII.

Mecopus.

Char. Gen. *Calyx* campanulatus, 4-fidus, lobo postico bidentato. *Corolla* papilionacea. *Stamina* diadelpha, $\frac{1}{9}$, persistentia. *Ovarium* brevi-stipitatum, biovulatum. *Legumen* longissimè stipitatum, membranaceum, uniloculare, monospermum ; vel rariùs articulatim biloculare, dispermum.

Herba *sesquipedalis, a basi diffusè ramosissima.* Folia *alterna, numerosissima, citò caduca, simplicia.* Stipulæ *distinctæ ; stipellæ binæ parvæ.* Racemi *terminales, ovati, densè comosi, e fasciculis plurimis 3-bracteatis compositi.* Pedicelli *plures abortivi, fertiles prope apicem post anthesin recurvati.* Flores *minimi.* Legumina *inter pedicellos bracteasque persistentes nidulantia.*

Mecopus *nidulans.*

Descr. Herba perennis (?), sesquipedalis, a basi ad apicem ramosissima. Caulis crassitie pennæ corvinæ, teres, striatus, glaber. Rami stricti, glabri, basi teretes, apicem versùs angulati, inferiores quandoque ferè sesquipedales, simplices, vel in exemplaribus majoribus ramulis plurimis alternis, 3—4-pollicaribus, plùs minùs angulatis, instructi. Stipulæ lineari-lanceolatæ, nervosæ, 2—4 lineas longæ, adpressæ, erectæ, distinctæ, post folia delapsa persistentes, inferiores lævigatæ, superiores pilis raris adspersæ. Folia numerosissima, præcipuè versus apicem caulis et in ramulis (stipulis persistentibus petiolorumque cicatricibus indicantibus) conferta, simplicia (ad foliolum impar scilicet reducta), reniformi-suborbiculata, paulò latiora quam longa, vix pollicaria, basi profundiùs, apice leviter emarginata, utrinque glabra, ad marginem integerrimum parcè ciliato-pilosa, penninervia, venosa, obsoletè minutè pellucido-punctata, citò caduca. Petioli longitudine foliorum, basi glandulosi, juxtà apicem sub articulo sæpè geniculato stipellis duâbus minutis instructi, sub folio ipso (in petiolulo) iterùm glandulosi, nunc unà cum foliis decidui, nunc (articulo apicis soluto) post ea brevi tempore manentes. Ad basin cujusque ramuli exstat utrinque appendix foliacea, lanceolata, semi-lineam longa, adpressa; aliæque subsimiles in axillis foliorum rameorum plerùmque latent. Racemi plurimi, caulis ramorum ramulorumque terminales, densè ovati, e pedicellis

Tab. XXXII



MECOPUS NIDULANS.

alternatim fasciculatis; fasciculo quovis (racemo abbreviato) pedicellisque singulis 1-bracteatis. Bracteæ fasciculorum pedunculorumque lateralium extimorum subæquales majores, 3—5-lineas longæ, stipulis simillimæ et non nisi apicibus pilisque apicalibus longioribus ab eis diversæ; reliquæ minutæ. Pedicelli in quovis fasciculo 6—8, 6—9 lineas longi, pilis subviscidis basi bulbosis hispidi, et pube breviore e pilis mollibus apice uncinulatis vestiti, juxta apicem subitò retrofracti, sub calyce articulati, articulo soluto sæpè efloriferi. Flores minuti. Calyx minimus, pilosus, breviter campanulatus, 4-fidus, lobo postico obsoletè bidentato, reliquis acutiusculis. Corolla papilionacea. Vexillum parvum, sessile, obovatum, vix emarginatum; alæ minores dimidiato-obovatæ, breviunguiculatæ, denticulo postico subobsoleto; carina parùm longior, unguibus brevibus, denticulis minimis, limbo connato cucullato mucronulato. Stamina diadelpha, $\frac{1}{9}$, persistentia, apicibus liberis filamentorum brevibus, incurvis; antheræ minimæ. Ovarium brevi-stipitatum, suturâ posteriore subrectâ, ovulis duobus subsessilibus. Stylus ejusdem ferè longitudinis, incurvus, stigmate parvo capitatus. Legumen planiusculum, pubescens, membranaceum, reticulato-venosum, 1—2-articulatum, articulis monospermis; suborbiculatis; ope stipitis post anthesin enormiter elongati, 3—5-lineas longi, legumen ipsum multò superantis, teretis, pubescentis, intra capitulum densè comosum nidulans. Semina reniformia, subsessilia, compressiuscula. Cotyledones parùm convexæ; radicula longiuscula, versùs hilum inflexa, accumbens.

In the dismemberment to which the Linnean genus *Hedysarum* has of late years been subjected, *Uraria*, founded by Desvaux for the reception of several Indian species, and *Eleiotis*, established by M. DeCandolle on the *H. sororium*, L., are the genera to which *Mecopus* appears to be most nearly allied. It is, however, strikingly distinguished at first sight, both in habit and technical characters, from these and every other genus of the tribe. As a distinctive character the excessive elongation of the stipes of the legumen, which takes place after the period of flowering is past, (and which, combined with the sudden and remarkable recurvation of the pedicel, enables the pod to bury itself in the dense mass of bracteæ and abortive flower-stalks composing the inflorescence, and there to deposit its seeds, to be retained until they are committed to the ground) is so obvious in itself, and so peculiar to the present genus, as to leave no doubt of the propriety of its separation. Nor, if we look to habit alone, is there any other genus which offers a near approach to the compact comose terminal racemes which are seated, like so many diminutive birds' nests, at the extremity of each of its early denuded branches.

In some respects, however, *Uraria*, (as has been suggested to me by Mr. Brown,) may be regarded as the most nearly related on account of its dense villous racemes, with the pedicels of the fruit most commonly strongly recurved. Its leaves, usually pinnate or trifoliolate, are also sometimes reduced to simplicity; the number of its seeds is occasionally diminished to two; and its pod is projected beyond the tube of the calyx. But the elongation of the stipes of the fruit does not exceed what is absolutely necessary for this purpose: the broad striated caducous bracteæ give to the racemes when young a very different appearance; and these racemes, which are frequently lateral as well as terminal, have none of the comose character produced by the lengthened bracteæ and abortive pedicels of *Mecopus*, the place of which appears to be supplied in *Uraria*, as far as relates to the protection of the seeds, by the produced and villous segments of the calyx.

The principal points in which *Mecopus* resembles *Eleiotis* consist in its dilated solitary leaflets, which, as in that genus, after falling off, leave the naked petioles tipped by their minute stipellæ; the small size of its flowers; the form of its calyx, which is, however, somewhat more deeply toothed; the general structure of its corolla; its diadelphous ($\frac{1}{9}$) persistent stamina; and its membranaceous pod, usually containing only a single seed, and having a reticulated surface. It appears, however, to be wholly destitute of the small lateral foliola so commonly found in *Eleiotis sororia* as to have induced M. DeCandolle to characterize that form of the plant in which he supposed

them never to occur as a distinct species under the name of *El. monophylla.* These two presumed species have been very properly reunited by Messrs. Wight and Arnott*, who state that they "may be seen springing from the same root, and even on different branches of the same individual." They might, indeed, have gone still further, and added that it is not easy to find specimens of the supposed *El. monophylla* which do not offer, even on the same branches with the solitary leaflets, occasional instances in which the small lateral foliola constituting M. DeCandolle's character of *El. sororia* are also developed.

With *Eleiotis* the writers just quoted have associated a plant from the Mysore, long since sent to Sir Joseph Banks by Dr. Hamilton under the MS. name of *Hedysarum oxalifolium.* To this plant, which was also contained in Rottler's Herbarium, under the MS. name of *Hedysarum orbiculatum,* Messrs. Wight and Arnott give the name of *Eleiotis Rottleri.* Of the propriety of the separation of *Eleiotis* from *Desmodium* they appear to entertain doubts, and justly so if the plant in question be regarded as a genuine species of *Eleiotis.* It is in fact in various respects intermediate between that genus and the trifoliolate species of *Desmodium,* and must either serve as the bond of connexion between them, or be formed into a separate and independent group. The latter alternative is that which seems to me the most desirable, inasmuch as it has technical characters sufficient for the purpose, and a habit which, although in other particulars it approaches that of *Eleiotis,* differs widely from the latter in the nature of its foliation. The characters of this genus, for which I propose the name of *Oxydium,* are as follows:

Oxydium.

Calyx campanulatus, sub-bilabiatus, labio anteriore 3-partito, posteriore bifido. *Corolla* papilionacea. *Stamina* diadelpha, $\frac{1}{9}$, persistentia. *Legumen* compressum, membranaceum, articulatim biloculare, dispermum, vel rariùs uniloculare, monospermum ; suturâ subrectâ dilatatâ.

Herba *longissimè repens, parùm ramosa.* Folia *alterna, longiùs petiolata, trifoliolata, foliolis orbiculari-obovatis retusis, petiolulo terminali lateralibus parùm longiore.* Stipulæ *parvæ, distinctæ; stipellæ binæ ad foliolum terminale,* 1 *ad quodque laterale.* Racemi *axillares, foliis longiores, pauciflori* ; *pedicellis unifloris, binis plerumque simul ex axillâ bracteæ nervoso-striatæ caducæ ortis.*

Of these characters those which separate *Oxydium* from *Desmodium* as at present constituted are chiefly to be found in the pod; which, except in being most commonly biarticulate and dispermous, closely resembles that of *Eleiotis*; while its distinction from the latter is chiefly derived from its biovulate ovarium, and from the structure of its calyx, bilabiate and 5-parted, instead of being, as in *Eleiotis,* almost obsoletely 5-toothed. Its habit very closely approaches that of *Eleiotis,* except as regard the leaves, which are nearly equally trifoliolate at the summit of a long footstalk, the petiolule of the terminal leaflet not greatly exceeding in length those of the two lateral; whereas, in *Eleiotis,* the two lateral leaflets, when they occur, are at the very base of the footstalk, of infinitely smaller size, and so differently shaped, as to have induced Linnæus† to describe them as stipulæ, although clearly recognising their true analogy. On this resemblance in the leaves of *Oxydium* to the trifoliolate species of *Oxalis* (a resemblance not found to the same extent, so far as I am aware, in any other Hedysaroid genus) Dr. Hamilton founded his specific name above-mentioned, which has suggested the generic appellation now proposed. The nearest approach to this habit with which I am acquainted among neighbouring genera occurs in the *Desmodium triflorum* (Onobrychis Indica, minor, *Acetosellæ* foliis, *Mus. Zeyl.* p. 2.); but that plant differs very considerably from *Oxydium* in other particulars of habit, as well as in its fructification.

But these two genera, *Oxydium* and *Eleiotis,* although so nearly related to *Mecopus,* are wholly destitute of any

* *Prodromus Floræ Peninsulæ Indiæ Orientalis,* vol. i. p. 231.

† *Mantissa Altera,* p. 270.

similar provision for the security of their seeds, to that which forms so remarkable a feature in the economy of the latter. In placing this curious plant in my hands for description, Mr. Brown directed my attention to the variety and singularity of the modes adopted in the different subdivisions of the Linnean genus *Hedysarum* for the protection of the pod and its contents during their progress to maturity; and a recapitulation of some of the principal modifications in this particular may not be misplaced in the present article.

In many *Hedysara* and *Desmodia* (as those genera are now understood) this protection is afforded, somewhat in the same manner as in *Æschynomene*, simply by a thickening of the edges of the joints of the legumen, which frequently remain either permanently or at least for a considerable period indehiscent. In others, as for instance the *H. coronarium*, L., this thickening is accompanied by the gradual acquisition of a series of short and rigid prickles covering the entire surface of the joint. The indehiscence, thickening of the pod, and aculeation of its surface are carried to the extreme in *Onobrychis*, with the superaddition, in many species, of cristæ and ridges of various degrees of strength and capacity of resistance.

In another class of cases the calyx affords the principal means of protection, being either, as in *Ebenus*, densely villous with the pod buried deeply within its base, or, as in *Lespedeza*, simply persistent and enveloping the fruit. Combined with this more simple modification, so readily applicable to the monospermous genera, some of the polyspermous are furnished with a more complicated provision for the attainment of the same end. Thus in *Smithia*, *Lourea*, and *Uraria*, it is so contrived, that the seeds, instead of continuing, according to their original position in the ovarium, to be placed end to end, are by the alternate flexure of the pod in the intervals between them, piled upon each other with their flat surfaces applied together, and the whole of their joints are thus packed either entirely within the shelter of the calyx as in *Smithia* and *Lourea*, or in such a manner as to afford mutual protection to each other, when exserted beyond its tube, as in *Uraria*. But as if this alone were not sufficient, *Lourea* has its membranous calyx furnished with strong and projecting reticulated veins; that of *Smithia* acquires a firm glumaceous texture; and the pod of *Uraria* is not only protected by the densely villous covering of its calyx, but has, at least in several of the species, its pedicel recurved so as to bring it within the shelter to be derived from the tomentous mass of its raceme. In a similar manner *Nicolsonia*, which chiefly differs from *Uraria* in the straightness of its pod, finds a compensation for the want of the protection afforded by the piling up of the seeds, in the sudden twist of its pedicel, which enables the pod to entangle itself among the villous calyces and bracteæ composing the mass of its inflorescence.

The bracteæ too, which are merely auxiliary to the calyx in some of the preceding instances, in other cases serve as the principal means of accomplishing the object in view. This is peculiarly the case in *Zornia*, in *Phyllodium*, Desv., in *Ostryodium*, Desv., in *Geissaspis*, Wight & Arn.* (specimens of which are in the Banksian Herbarium from Bombay, Elephanta, and the Mysore), and in an elegant unpublished genus with equally diadelphous stamina, of somewhat similar habit to the last, collected in Sierra Leone by Afzelius, of which specimens are also contained in the same collection. A similar protection is given in *Stylosanthes*, the closely imbricated bracteæ of which completely envelope its fruit.

In *Mecopus* several of these provisions are combined, with the addition of one still more remarkable, and altogether peculiar to itself. Its calyx is and remains too minute to envelope any portion of its fruit, and its pod has neither thickening of substance, except in a slight venous reticulation, nor any of those irregularities of surface which have been noticed as occurring in several genera of the tribe. But its long hairy bracteæ are accompanied by a considerable number of equally hairy abortive flower-stalks forming a dense mass, into which the pod is retroverted by a twist of the pedicel, similar to that which occurs in *Uraria* and *Nicolsonia*, but much more complete; and the extreme elongation of its stipes (far exceeding that which occurs in any known genus of *Papilionaceæ* with stipitate fruit) plunges the short pod into the very centre of the fructiferous raceme, where it remains

* *Prodromus, &c.* i. p. 217.

imbedded, until the decay or destruction of the surrounding parts enables it to extricate itself, and allows its contents to escape and find their way to the earth.

In conclusion I may state that this very curious genus appears not to be peculiar to the Flora of Java, inasmuch as flowering specimens of the same species occur in the Banksian Herbarium, which were sent home many years since by the Missionaries in Tranquebar, and were therefore probably collected in *that* part of the Peninsula of Hindoostan, or in some of the neighbouring islands. In Java, acccording to Dr. Horsfield's Notes, "it appears to be extremely rare and local in its distribution. I found it," he says, "in 1815 in a single situation only, in a low dry tract near one of the teak-forests in the Province of Pronoroyo, about a hundred miles eastward of the capital of Surakerta."

I. J. B.

TAB. XXXII. *Fig.* 1. A plant of *Mecopus nidulans*, of the natural size. *Fig.* 2. The lower part of its stem with the root. *Fig.* 3. The calyx, with the male and female organs, magnified. *Fig.* 4. The petals. *Fig.* 5. A legumen, with the persistent calyx and stamina; showing the curve of the pedicel and the excessive elongation of the stipes. *Fig.* 6. A seed. *Fig.* 7. The embryo. All magnified.



PHYLACIUM BRACTEOSUM.

PHYLACIUM BRACTEOSUM.

TAB. XXXIII.

PHYLACIUM.

CHAR. GEN. *Calyx* bibracteolatus, 4-fidus, lobo postico vix emarginato. *Corolla* papilionacea; vexillum auriculatum, cum alis subæqualibus cohærens; carinæ petala connata. *Stamina* diadelpha, $\frac{1}{9}$, decidua. *Ovarium* 1-ovulatum. *Legumen* subrotundum, compressum, reticulato-nervosum.

Herba *volubilis; foliis trifoliolatis; stipulis distinctis; foliolis stipellatis; floribus parvis, axillaribus, racemosis, bracteâ membranaceâ, inter et post anthesin maximè auctâ, demùm revolutâ, compresso-cucullatâ, inclusis.*

PHYLACIUM *bracteosum.*

DESCR. Herba volubilis. Caulis gracilis, teres vel paulùm angulato-striatus, pilis brevibus deorsùm appressis pubescens, ramosus, foliosus. Folia alterna, trifoliolata, petiolata; petiolis pollicaribus usque bipollicaribus, basi glandulosis, patentibus vel deflexis, filiformibus, suprà sulcatis, pilosiusculis; petiolulis lateralibus brevibus, glandulosis, cum petiolo articulatis, plerumque deflexis; petiolulo terminali semipollicari, recto, ultra medium articulato et inde glanduloso. Foliola ovalia, obtusa, quandoque subretusa; lateralia pollicem usque duas pollices longa, lineas octo ad pollicem lata; terminale bi-tri-pollicare, pollicem usque sesquipollicem latum; omnia membranacea, nervo medio tenui in mucronulum brevissimum excurrente, venisque anastomosantibus pulchrè reticulata, suprà glabra, infrà pilis simplicibus rigidis appressis subsericea. Stipulæ duæ, distinctæ, parvæ, lanceolatæ, acuminatæ, striatæ, pilosæ, erectæ, appressæ; stipella unica ad basin cujusvis petioluli lateralis; duæ sub articulo petioluli terminalis. Racemi axillares plures (2–10) aggregati, e communi basi oriundi, pauciflori, florentes longitudine ferè petioli communis, fructiferi plùs minùs elongati, geniculatim nodosi, ad nodos floriferi; gemmis inferioribus plerumque abortientibus, superioribus (quandoque unico tantùm) florentibus. Pedicelli subsolitarii, lineas duas ferè longi, pilosiusculi; singuli bracteâ foliaceâ subtendente muniti. Bractea subtendens petiolata, ovata, suprà glabra, infrà sericea, primùm involuta, parva, dein per anthesin et usque ad fructûs maturationem persistens, maximè aucta, denique revoluta et marginibus arctè applicitis cucullum lateribus complanatum efformans, membranaceum, obliquè ovatum, sesquiuncialem, extùs (in paginâ

nempè superiori) glabrum, intùs (paginâ inferiori) sericeo-pilosum, florem fructumque foventem, et cum eis demùm decidentem. Stipulæ duæ minimæ ad basin petioli bractealis. Bracteolæ calycinæ duæ, laterales, parvæ, subulatæ, pilosæ, calyci appressæ eoque dimidio breviores. Calyx tubulosus, sesquilineam longus, ad medium ferè 4-fidus, pilosiusculus; lobis ciliatis, antico paulò longiore lanceolato, postico latiore ovato binervoso vix ac ne vix emarginato. Corolla papilionacea, calyce duplò longior: vexillum longiùs unguiculatum; ungue lineari; laminâ ovato-subrotundâ, basi biauriculatâ; auriculis inflexis alarum appendices quasi forcipe prehendentibus, dein callo parvo intùs instructâ: alæ vexilli longitudine, unguiculatæ, posticè appendiculatæ, appendicibus calcariformibus deorsùm incurvis in vexilli auriculas receptis, ungue dimidio ferè brevioribus; laminis lineari-oblongis obtusis apice subcrispatis: carinæ petala alis paulò breviora, connata, unguiculata, appendicibus brevissimis obtusis; laminis obliquè obovatis, obtusis. Stamina diadelpha, $\frac{1}{9}$, disco brevissimo ovarii stipitem cingenti inserta; vagina longitudine ferè petalorum, e filamentis 9 anterioribus ferè usque ad apicem connatis, decimo posteriore libero. Ovarium brevè stipitatum, lanceolatum, pilosum, vaginâ filamentorum triplò quadruplòve brevius; stylo longo filiformi stigmate simplici terminato intra vaginam incluso. Ovulum unicum, oblongum, amphitropum, medio ope funiculi brevissimi affixum. Legumen stipite brevi calyce persistente obtecto suffultum, ovato-subrotundum, anticè convexum, posticè rectiusculum, lateribus compressum, styli basi persistente mucronatum, tres vel quatuor lineas longum, pergamentaceum, reticulato-nervosum, hirsutum. Semen obliquè ovale, compressum, hilo ferè mediano; testa castaneo-nigra, lævis; membrana interior testæ arctè adhærens. Cotyledones subcartilagineæ, planiusculæ; radicula accumbens, versus hilum deorsùm incurva.

In the preceding article mention is made of various contrivances occurring in the tribe of *Hedysareæ* for the better protection of the fruit. The mode in which this purpose is effected in *Phylacium* is extremely curious, and deserves especial notice. The subtending bracteæ, or those which are placed at the base of the flower-bearing pedicels, enlarge very greatly at the time of flowering and during the progress of the fruit to maturity; and at the same time their stipes or petiole bends upwards, while the pedicel of the flower or not unfrequently the terminal portion of the raceme (when the enlargement takes place in one of the lower bracteæ) curves downwards. By means of these mutual displacements the flower or portion of inflorescence is brought into relation with the under surface of the bractea, which then folds backwards along its midrib, bringing its margins into contact with each other, and thus forms a compressed cucullate bag for the protection of the flower and fruit. At the period of maturity these enveloping bracteæ readily fall off together with their contents, and doubtless contribute much by their levity to the dispersion of the seeds.

The nearest approach to this singular contrivance with which I am acquainted is found in *Flemingia strobilifera*, R. Br. (*Ostryodium*, Desv.), in which the floriferous branches of the compound axillary raceme are each subtended by a similar membranaceous bractea, with the under surface of which they in like manner place themselves in contact, by which they are then similarly enveloped, and finally by means of its complete resupination brought into their original position. In this case the bracteæ are less closely folded together than in *Phylacium*, and form by their imbrication the strobile-like inflorescence, from which the species takes its name. In both plants the foliaceous origin of the bracteæ is distinctly marked by the stipulæ which continue to accompany them; but in *Flemingia strobilifera* the leaf itself is reduced to simplicity, and there is consequently less of change in its transition to the state of bractea, while in *Phylacium* the terminal leaflet alone is continued under that altered form. In *Phyllodium* on the other hand the terminal leaflet of the trifoliolate leaf is abortive in the bracteæ, while the two lateral leaflets remain, somewhat changed in form but scarcely altered in texture, and are still provided with

their stipulæ and stipellæ, and even with the petiolule of the lost terminal leaflet. Here too the under and not the upper surface of the bracteæ is applied (by means of a lateral twist of the petiolules) to the flower and fruit, to which, from their size, texture, and close application to each other, they afford a very efficient protection. A different modification again occurs in *Zornia* and *Geissaspis*, in which the stipulæ become enlarged and fulfil the office of bracteæ; both stipulæ in the former case protecting a single flower and its jointed pod, while in the latter each of the closely imbricated alternate stipulæ shelters within it a flower and its generally single-seeded fruit. In these cases there is no resupination, but the surfaces of the stipular bracteæ retain their original position unchanged.

Phylacium exhibits the comparatively rare character among *Leguminosæ* of an *ovarium* 1-*ovulatum*. This alone distinguishes it from all other Hedysareous genera except *Eleiotis*, *Lespedeza*, and *Onobrychis*; for *Geissaspis* is biovulate, although most commonly only a single seed arrives at maturity, as indeed are some of the species of *Onobrychis* (for example *O. Tournefortii*), while others (*O. sativa* for instance) have but a single ovule. With these genera, however, it is scarcely necessary to compare *Phylacium*, differing as it does so greatly from all of them in habit and in calyx, from all but *Lespedeza* in corolla, and from *Lespedeza* and *Onobrychis* in its fruit. In the last-named character it approaches more nearly to *Eleiotis* and *Geissaspis*, but its pod is of a more coriaceous texture, and is not accompanied as in them by the stamina, which instead of remaining persistent, fall off as soon as their proper function is completed.

The habit of *Phylacium* is that of many *Phaseoleæ*, and altogether different from other Hedysareous genera, none of which are climbers: its pod, however, distinctly marks it as belonging to the latter tribe. The most important features by which it is assimilated to *Phaseoleæ* are its twining stem, its fasciculated, flexuous, axillary racemes, and its unguiculate vexillum grasping by means of its auricles the spur-like appendages of the alæ, and furnished with a slight rudimental callosity. These circumstances seem to indicate that, in conjunction with *Flemingia* (its relation to one species of which has already been noticed), it assists in forming the transition between these two extensive tribes. I. J. B.

Tab. XXXIII. *Fig.* 1. The terminal portion of the stem of *Phylacium bracteosum*, of the natural size. *Fig.* 2. A flower, magnified. *Fig.* 3. Its vexillum. *Fig.* 4. One of the alæ. *Fig.* 5. One of the petals of the carina. *Fig.* 6. The stamina and pistillum. *Fig.* 7. The ovarium laid open. *Fig.* 8. The ovule. All magnified. *Fig.* 9. The pod. *Fig.* 10. The seed, slightly enlarged.

PAROCHETUS MACULATUS.

TAB. XXXIV.

PAROCHETUS, *Buchan. Ham. in Don, Prodr. Fl. Nep.* p. 240.

CHAR. GEN. *Calyx* nudus, campanulatus, 4-fidus, lobo postico 2-dentato, anteriore reliquis paulò longiore. *Corolla* calyce longior, papilionacea; *vexillo* obovato, emarginato; *alis* paulò brevioribus carinam subæqualem tegentibus. *Stamina* diadelpha ($\frac{1}{9}$). *Stylus* filiformis, glaber. *Stigma* obtusum. *Legumen* lineare, compressum, polyspermum. *Semina* reniformia, lenticulari-compressa.

Herbæ *perennes, longissimè repentes.* Folia *longissimè petiolata, subæqualiter trifoliolata.* Foliola *obovata, retusa.* Stipulæ *distinctæ membranaceæ.* Pedunculi *axillares, solitarii, 1—3-flori; pedicellis ad basin bibracteolatis, umbellatis.* Flores *magni, purpurei.*

P. maculatus, foliolis lato-obcordatis subintegerrimis maculatis.

DESCR. Herba perennis. Caulis longissimè repens, vix pennæ corvinæ crassitie, ad nodos radiculas fibrillosas longas tenuissimas demittens; supernè parum ramosus, internodiis filiformibus, 2—4-pollicaribus, vix hic illic pilosulis. Folia longissimè petiolata, 3-foliolata. Petiolus 4—8-pollicaris, complanatus, 3-nervis, vix pilosulus. Foliola brevissimè glanduloso-petiolulata, subæqualia, pollicaria, lato-obcordata, integerrima, vel quandoque obsoletissimè crenato-dentata, suprà glaberrima, infrà pilosula, lætè viridia, nigro-maculata. Stipulæ ovato-lanceolatæ, membranaceæ, nervoso-striatæ, pilosulæ: stipellæ nullæ. Pedunculi axillares, solitarii, petiolis sesqui-longiores, filiformes, complanati, versus apicem nervoso-striati, juniores pilosuli, adultiores lævigati, 2—3-,vel rarissimè 1-,flori. Flores ad apicem pedunculi breviter pedicellati. Pedicelli umbellati, pilosi, singuli ad basin bracteolis duâbus membranaceis, nervoso-striatis, ovatis, apice laceris, stipati. Calyx ferrugineus, pilosus, subcampanulatus, basi tubulosus, ad medium usque 4-fidus, lobis lanceolatis acutis, posteriore latiore acutè 2-dentato, anteriore paulò longiore. Corolla papilionacea, pentapetala, purpurea. Vexillum amplum, obovatum, emarginatum, ungue latiusculo affixum, marginibus demùm reflexis. Alæ ejusdem ferè longitudine, dimidio angustiores, lanceolato-

Tab. XXXIV.



J. Curtis del. et sculps.

PAROCHETUS MACULATUS.

obovatæ, unguiculatæ, dente postico unguem ferè longitudine æquante instructæ. Carina e petalis duobus supernè anticè concretis, longitudine alarum, dimidiato-obovatis, apice obliquè truncatis, unguiculatis nec basi dentatis, colore saturatioribus. Stamina 10, diadelpha, $\frac{1}{9}$, filamento posteriore ad basin usque libero, anterioribus 9 ferè ad apicem coalitis, supernè in parte liberâ axin versus inflexis. Antheræ parvæ, oblongæ, biloculares. Pollen parvum, ellipticum, lævissimum. Ovarium sessile, lineare, apice attenuatum, 1-loculare, polyspermum; ovula circiter viginti, subrotunda, funiculis longiusculis affixa. Stylus ovarii longitudine, filiformis, glaber, una cum filamentorum apicibus inflexus, stigmate parvo obtuso capitatus. Leguminum pedicelli elongati, pollicares, divaricati. Legumen pollicare, duas lineas latum, compressum, lineare, apice basique obliquè acutum, styli basi brevi recurvâ apiculatum. Semina plura, 8—12, funiculis brevibus transversim affixa, obliquè reniformia, lenticulari-compressa; hilo subrotundo. Raphe lata conspicua ab hilo ad extremitatem seminis inferiorem ducta. Cotyledones crassiusculæ, transversim subreniformes. Radicula majuscula, accumbens, obtusa, hilum supernè spectans.

The genus *Parochetus*, first named by Dr. Buchanan Hamilton and defined by Mr. D. Don*, forms a distinct and well-marked group of *Papilionaceæ*, of small extent, and apparently limited in its geographical range to India and the Indian Islands. Its resemblance in habit to the common form of *Oxalis* distinguishes it at first sight from all those genera with which, from a general similarity in technical characters, it might, on a cursory examination, be confounded. With *Cacara* of Du Petit Thouars† (*Pachyrhizus*, Rich. MSS. in Dec. Prodr. 2, p. 402.) from which M. DeCandolle (who knew the genus *Parochetus* only through the characters given by Prof. Don) regards it as scarcely distinct, it has really little in common; *Cacara* being apparently only a convenient section of *Dolichos*, with which *Parochetus* has little affinity. Mr. Bentham‡ has lately proposed to remove the latter from M. DeCandolle's tribe of *Phaseoleæ*, in which it had been placed, on account of this supposed resemblance, and to place it among his *Trifolieæ*, with which it certainly evinces a much nearer affinity, both in habit and essential characters. But unfortunately the subdivisions rendered necessary by the vast extent of this great family are not yet circumscribed with sufficient exactness to admit of our assigning a fixed position to a very considerable number of the genera which compose it. It is therefore with great hesitation that I venture to propose a place for one, the immediate affinities of which do not appear to me to be clearly ascertained. If, however, *Lotus* be taken as the type of one small division of the family, formed by a few genera immediately related to it, and *Glycine* of another similar section, it will, I think, be found that the genus in question establishes a connecting link between the two, approaching perhaps more nearly to the latter than to the former.

The species of *Parochetus* hitherto described are three in number, all from the mountain districts of Hindoostan. Two of these, *P. communis* and *P. major*, were originally collected in Nepaul by Dr. Hamilton, and were also contained in Dr. Wallich's Herbarium from the same country. The latter, or at least a plant considered by Messrs. Wight and Arnott§ to be referrible to it, and from their description probably the same, was also contained in Dr. Wight's Herbarium from the Neelgherries, a distant quarter of the Peninsula, and indicating a great extent of geographical range. A third species has been added by Professor Royle‖, his *P. oxalidifolius*, which he had

* *Prodr. Fl. Nepal.*, p. 240.

† *Dict. des Sci. Nat.* 6. p. 35. Compare, on the subject of the nomenclature of this genus, M. DeCandolle's observations in his "Mémoire sur les Légumineuses," p. 379 and p. 464.

‡ In Royle's Illustrations of the Botany of the Himalayan Mountains, p. 204, and in *Ann. Wien. Mus.* 2, p. 114.

§ *Prodromus Floræ Peninsulæ Indiæ Orientalis*, vol. i. p. 251.

‖ Illustrations of the Botany of the Himalayan Mountains, p. 201, t. 35, f. 1.

originally referred to *P. communis*, conceiving the latter to be also identical with *P. major*. A close examination, however, led to their separation, and this seems to be justifiable, although, as far as can be judged from the figure, the new species differs from *P. major* in little besides the integrity of the margins of its leaves. The crenation in those of the latter is not, however, always very obvious, but it occurs with sufficient distinctness on some of the leaves of every specimen that I have seen; and as Prof. Royle states that he has never seen his plant except with the most completely entire leaves, it seems better, at least provisionally, to keep them separate.

The Javanese plant, now figured and described, differs from *P. major*, to which it also approaches more nearly than to the other species, in the larger size of all its parts, the greater proportionate breadth of its almost constantly entire leaflets, the greater breadth and depth of emargination at their extremities, and their very obvious and characteristic maculation. In the generic character, I have translated, with some little alteration, that given by Messrs. Wight and Arnott, which is an enlargement of Mr. D. Don's. These authors appear equally uncertain as to the true position of the genus. I may add that there is an evident analogy (a near affinity is here out of the question) between *Parochetus* and the genus described in a previous article under the name of *Oxydium*, an analogy so striking as to have justly procured for plants of both genera the specific name of *oxalidifolius*.

Parochetus maculatus, "Somangen or Somangi-gunung of the Javanese, was found" by Dr. Horsfield "in 1805, at an elevation of more than 6000 feet above the level of the ocean, near the village of Sello, in the acclivities of the Mountain Merbaboo. It appears to be less generally distributed than many other mountain-plants of Java." I. J. B.

Tab. XXXIV. *Fig.* 1. A plant of *Parochetus maculatus*, of the natural size. *Fig.* 2. The vexillum, magnified. *Fig.* 3. One of the alæ. *Fig.* 4. One of the petals of the carina. *Fig.* 5. The stamina and pistillum. *Fig.* 6. The legumen, of the natural size. *Fig.* 7. The same, laid open. *Fig.* 8. A seed, magnified, seen on the side of the hilum. *Fig.* 9. The same, seen laterally. *Fig.* 10. The embryo.

Tab. XXXV.



SACCOPETALUM HORSFIELDII.

SACCOPETALUM HORSFIELDII.

TAB. XXXV.

SACCOPETALUM.

CHAR. GEN. *Calyx* 3-sepalus. *Petala* 6, biserialia; exteriora sepaloidea; interiora valvatim cohærentia, denique libera, basi saccata. *Receptaculum* subglobosum. *Stamina* numerosa; antheris sessilibus cristatis. *Ovaria* numerosa, libera, 6—10-ovulata. *Carpella* stipitata, polysperma.

Arbor; *ramis floriferis denudatis.* Flores *solitarii vel quandoque bini, pedicellati, e foliorum delapsorum axillis prodeuntes, majusculi.*

SACCOPETALUM *Horsfieldii.*

DESCR. Arbor. Ramuli penultimi crassitie pennæ anserinæ, teretiusculi, cortice cinerascenti longitudinaliter corrugato vestiti; novelli densè ferrugineo-pubescentes. Folia in ramulis ultimis post flores evoluta, alterna, oblonga, basi obtusa obsoletè cordata, apice breviter acuminata, 4—6 pollices longa, pollicem ad sesqui-pollicem lata, integerrima, minutissimè pellucido-punctata, ferruginea; suprà glabriuscula, nervo medio venisque primariis pilosulis; infrà, præsertim in nervo medio venis primariis et ad marginem, pilis brevibus adpressis conspersa; juniora in ramulis novellis floriferos terminantibus pollicaria, densè pubescentia. Petioli breves, lineas 2 circiter longi, pubescentes. Flores in ramulis denudatis quasi paniculati, reverà tamen solitarii vel quandoque bini ex axillâ folii delapsi prodeuntes. Pedunculi semi-pollicares, filiformes, pubescentes, juxta basin bracteâ unâ alterâve minutâ instructi, e quarum axillis pedicelli dum flores bini originem ducunt; bractea altera minutissima a calyce remota. Calyx 3-sepalus, sepalis ovatis, sericeo-pubescentibus, lineam vel sesqui-lineam longis. Petala 6, biserialia: exteriora calycina, cum sepalis alternantia iisque simillima, nisi quod paulò longiora et magis acuminata; interiora pollicaria, subcoriacea, velutina, oblongo-ovata, juniora basi simplicia, adulta basi saccata, inter se valvatim cohærentia, ab apice versus basin gradatim secedentia, corollam gamopetalam 3-fidam vel 3-partitam æmulantia, demùm florescentiâ ferè peractâ libera, nervo medio crassiusculo venisque parallelis utrinque 3 vel 4 instructa. Receptaculum subglobosum, sericeo-pilosum. Stamina numerosa, circiter 36, in seriebus 4 supra receptaculum disposita, e quibus in quâvis serie 1 petalo cuique exteriori, 2 petalo interiori, opposita. Antheræ sessiles, extrorsæ, ovales, biloculares, loculis rimâ longitudinali

dehiscentibus; connectivo lato in glandulam apicalem ferrugineam ultra antheram producto. Pollen parvum, subglobosum. Ovaria numerosa, 20—30, libera, pubescentia, stigmate glabro majusculo sub-hemisphærico sessili coronata. Ovula plura, 6—10, uniserialia, funiculis brevissimis ovarii parieti interno secus longitudinem affixa. Receptaculum fructiferum vix auctum densè sericeum. Carpella 15—20 (juniora tantùm visa) dimidiato-ovata, vel hemisphærica, latere interno subrecta, minutè pubescentia, substantiâ sublignosa, stipitata; stipitibus 2—3 lineas longis, pariter pubescentibus. Semina ferè tot quot ovula, dissepimentis spuriis in loculis 1-spermis superimpositis segregata. Albumen ruminatum.

Among the remarkable forms of *Annonaceæ* that have been distinguished as genera since the publication of the first volume of M. DeCandolle's "Prodromus," are two in which the petals of the outer series approach so nearly in character to their accompanying sepals, that, were there no analogies to guide us in the determination, we should not hesitate to regard them (as in one case they have actually been regarded*) as forming part of the calyx rather than the corolla. Both these genera (*Miliusa* of MM. Leschenault and Alphonse de Candolle†, and *Hyalostemma* of Dr. Wallich‡) are further remarkable for so prolonged a continuance of the cohesion between the edges of their inner series of petals, as to have induced the eminent botanists by whom they were distinguished to regard them as possessing a gamopetalous corolla.

In both these particulars the genus now for the first time described coincides with those which have just been named, and the three together may consequently be regarded as forming a well-marked section of the family distinguished by these striking peculiarities, which are not, however, without approximating characters in other plants. Thus, for instance, an unpublished species, discovered by Dr. Buchanan in the Andaman Islands, and described in his MSS. under the name of *Uvaria? venosa*, (of which a specimen exists in the Banksian Herbarium, but too imperfect for a complete analysis) has the same calycine appearance in the outer series of petals; and this is also the case with the *Uvaria tripetala*, Roxb., in which, however, the petals of the inner series have no continued adhesion, but are lengthened, thickly coriaceous and valvate, with a marked internal keel, like the outer series of many of the tripetaloid species of *Annona*.

Another curious series of plants contributes to fill up the interval between the group in question and the remainder of the family: it is that in which the inner series of petals, instead of separating gradually from the apex to the base, and retaining their union longest at the latter part, lose their connexion at the base at a very early period, and while their narrow ungues become more and more widely separated, retain a prolonged and sometimes a permanent union of their expanded apices, which are spread in the form of a canopy over the reproductive organs. This singular structure is found in the *Uvariæ Mitrephoræ*§ of Dr. Blume, in his *Uvaria reticulata*‖, in several species of his genus *Polyalthea*¶, in his *Orophea***, and in two nearly related and undescribed plants in the Banksian Herbarium, collected by Dr. Buchanan in the Andaman Islands, one of which agrees with the *Mitrephorous Uvariæ* in its polyspermous ovaria, but differs in their reduced and definite number; while the other, which has very numerous stamina, appears to be diœcious. In all these plants, however, the outer series of petals, although differing greatly in form and appearance from the inner, have much more of the corolline than of the calycine character.

The small group of genera to which our attention is now more particularly directed, including *Saccopetalum*, *Miliusa* and *Hyalostemma*, present, notwithstanding their close agreement in the structure of their floral envelopes,

* Roxburgh, *Flora Indica*, ed. 1832, vol. 2, p. 659 (*Uvaria dioica*).

† *Mémoire sur les Anonacées*, p. 37.

‡ List, No. 6434.

§ *Flora Javæ, Anonaceæ*, p. 13.

‖ l. c. p. 50.

¶ l. c. p. 68.

** l. c. p. 81.

the most essential differences in the number of their ovula, and thus offer a striking example of the anomalies which are seen to pervade the whole family, whenever any particular character is taken as a guide in the co-ordination of the genera. Since the period when Mr. Brown* first introduced the number of the ovula in each ovarium into the diagnosis of the genera of *Annonaceæ*, this character has justly been regarded as one of primary importance. But in the three genera in question we have three distinct modifications in this essential particular; the number of the ovula being indefinite in *Saccopetalum*, two only in *Miliusa*, and still further reduced in *Hyalostemma* to the minimum of one.

The stamina also are subject to some modifications; less extensive, however, than the character and description of *Miliusa* given by M. A. DeCandolle would lead us to believe. Their number in that genus, according to my observation, is about 27 instead of 12, forming three alternating series, in each of which 2 are opposed to each of the inner and 1 to each of the outer petals. From this structure *Saccopetalum* differs, as we have seen, only in the possession of a fourth series, increasing the number to about 36. *Hyalostemma*, on the other hand, is truly diœcious, the female flowers not exhibiting even a rudiment of stamina, although these organs, according to Dr. Roxburgh's description, are numerous in the male. All the specimens in the Banksian Herbarium, both from Roxburgh and Dr. Wallich, are female.

In the form of the receptacle, (a character of considerable importance among *Annonaceæ*, first employed by M. Auguste St. Hilaire†) the three genera are nearly identical; and there remains little else to confirm the distinction between them, if we except the very remarkable peculiarity in the habit of *Saccopetalum* arising from the development of its flowers on the denuded branches prior to the appearance of the leaves which accompany the fruit. Were M. A. DeCandolle's‡ description of *Miliusa* strictly correct, there would indeed exist several very extraordinary discrepancies between that genus and the other two; but I am strongly inclined to place these discrepancies to the account of the badness of his specimens, the imperfection of which may be inferred from the doubts which he himself expresses with regard to several particulars of its structure. A single specimen in the Banksian Herbarium, collected by Dr. Heyne, and forming part of the noble collection distributed by Dr. Wallich on behalf of the Court of Directors of the East India Company, has afforded me the opportunity of explaining the most anomalous parts of M. A. DeCandolle's description, and of reducing them to the ordinary type of the family, from which, in the description, they are so widely different. Of the identity of the two plants there can be little doubt, the figure and description referred to agreeing in all respects, except in the particulars in question, with the specimens of Dr. Wallich's List; and part of the latter being from the same locality, spelt Cotta-lam by Leschenault, and Courtallum in the Madras Herbarium.

The first and most striking of these anomalies is expressed by M. A. DeCandolle in the following terms:—"Calyx tripartitus—Corolla gamopetala—3-fida, seu e tribus petalis ovato-acuminatis a basi usque ad mediam partem connatis constans—ad basin concava seu cucullata,—internè ad originem in 3 appendices pilosas lineam longas lobis præcipuis oppositas fimbriatas duplicata;" and a similar account of the structure of these parts is given in his preliminary observations§. The figure‖ also represents the calyx as three-parted, and the corolla as composed of three cohering petals. In the specimen before me the sepaloid organs are at once seen to be six in number; 3 of them opposed to the 3 cohering petals, and evidently from their position to be regarded as forming the calyx, and 3 placed more internally, alternating with both the other series between which they are placed, and as evidently representing, by analogy with other genera of the family, the outer series of petals. Now the three supposed divisions of the calyx in M. A. DeCandolle's figure alternate with the three cohering divisions of the corolla, and consequently represent the outer petals, the true calyx being thus altogether omitted. In the

* In Botanical Register, t. 423.

† *Flora Brasiliæ Meridionalis*, 1, p. 28, &c.

‡ *Mémoire sur les Anonacées*, p. 37–8.

§ l. c. p. 14.

‖ l. c. t. 3.

description this deficiency seems to be supplied by the three supposed *internal* appendages opposite to the base of the cohering petals, of which, however, no traces are observable in the figure. Their description, except with reference to their position *within* the petals, is perfectly applicable to the true sepals; and it is probable that the author has been deceived by the badness of his materials and by an imperfect view of the parts, into regarding the latter as appendages to the former, to which they are in fact opposed, but with relation to which they are of course external. This supposition may at least serve to explain the description: it is less easy to account for the figure; but it may be presumed that the artist, aware that the plant was described as having only three divisions to its calyx, was satisfied with having found that number of sepaloid parts, and it is possible that the true sepals (easily detached at maturity, as in *Saccopetalum* and *Hyalostemma*) may have fallen off during the process of manipulation.

The family of *Annonaceæ* is not, however, without an example of a three-parted calyx encircling a three-lobed gamopetalous corolla: this structure occurs in *Rollinia**, a genus widely separated from *Miliusa* and its allies. In this case M. A. DeCandolle† hesitates whether to regard the outer sepaloid verticillus as calyx or as the representative of the three outer petals; the calyx being, in the latter hypothesis, abortive or represented by three obsolete teeth. These teeth, however, may be regarded as potential, rather than as actually existing; and the alternative which suggests that the corolla is here reduced to a single verticillus formed of three connate petals appears to be the most conformable to analogy. The cohering petals, alternating with the divisions of the calyx, would of course belong to the outer series, and the inner must be regarded as altogether abortive. This view is confirmed by the structure of many species of the closely allied genus *Annona*, in which the very minute internal petals have frequently been overlooked, while in others they seem to be altogether wanting. Between these tripetalous species of *Annona* and the genus *Rollinia* there exists no other distinction than the intimate union of the petals of the latter and their singular dorsal prolongation; and if we could conceive the deep internal depression at the base of the thickened petals of the former expanded at its margins, those margins united with the other petals, and the apices of the petals separated from each other, thrown backwards, and laterally compressed, we should have the corolla of *Rollinia* formed, with little essential modification, from that of an *Annona*. Of the six lobes of which M. A. de St. Hilaire supposes the corolla of *Rollinia* to be composed, I can perceive no evidence.

Another striking deviation from the usual character of the family occurs, according to M. A. DeCandolle, in the number and formation of the stamina of *Miliusa*, which are described as probably no more than twelve, and are stated to be composed of minute antheræ supported on slender elongated filaments. A more detailed description to the same effect is afterwards given; and the genus is said to approach *Bocagea*‡ in the definite number of its stamina, and *Anaxagorea Javanica*, Bl. in the form and position of its antheræ. We have already seen, however, that these organs are much more numerous; and we find on examination that they agree sufficiently well in structure with the common *Annonaceous* type. In the only flower (an unopened one) which I have examined, the antheræ were of moderate size, nearly sessile, and closely resembled those of *Saccopetalum* except in the absence of the glandular termination of the connectivum, which was reduced to a mere rudiment. There was in this case no appearance of any tendency to subsequent elongation of the filaments; and it may be observed that that which takes place in the Javanese species of *Anaxagorea*, referred to as an analogous case, appears, according to Dr. Blume's figure and description§, to occur only in the inner series, which become abortive, and thus have their character entirely changed, while the outer or fertile anthers remain subsessile and retain the usual appearance.

M. A. de St. Hilaire appears to have fallen into a somewhat similar error in describing the stamina of his genus *Bocagea*, to which he attributes dilated filaments, supporting near their apices abbreviated antheræ. In a flower of *Bocagea viridis*, A. St. Hilaire, taken from a specimen collected by Sellow in Brazil, I find that the sup-

* Auguste de St. Hilaire, *Flora Brasiliæ Meridionalis*, I, p. 28.

† *Mémoire sur les Anonacées*, p. 15, 16, 23.

‡ Aug. de St. Hilaire, *Flora Brasiliæ Meridionalis*, tom. 1, p. 41.

§ *Fl. Javæ, Anonaceæ*, p. 64, t. 36 A.

posed dilated filament constitutes the lower part of a nearly sessile anthera, the sutures of which dehisce at maturity only in its upper half, although its cavity is produced (replete perhaps with less perfect pollen) nearly to the very base. It may be added, that in the flower examined the stamina were nine in number instead of six, thus exactly corresponding with the number of parts of the floral envelopes; and it may be further observed, that the very different form and mode of arrangement of the latter organs is fully sufficient (even were there no more important differences between the two genera) to justify the retention proposed by M. A. DeCandolle* of Dr. Blume's *Orophea*†, notwithstanding that the latter has been blended by the author‡ himself with the *Bocagea* of M. A. de St. Hilaire.

Saccopetalum Horsfieldii was found by Dr. Horsfield "in 1814, in the province of Banyumas, situated to the west of the capital of Surokerto, and belonging to the Native Princes' Territory. It was growing on a low range of hills at no great distance from the southern shore. The natives apply the name *Kalak* to this and to several other trees of the same family. The stem is arboreous and erect; the branches spreading; the smaller branches verrucose, flexuous and deflected at the extremity. The branchlets were most profusely covered with flowers."

I. J. B.

TAB. XXXV. *Fig.* 1. Portion of a flowering branch of *Saccopetalum Horsfieldii*, of the natural size. *Fig.* 2. Portion of a branch bearing leaves and half-ripe fruit. *Fig.* 3. A flower, with the inner series of petals removed, magnified. *Fig.* 4. A vertical section of the receptacle, showing the arrangement of the stamina and pistilla. *Fig.* 5. One of the stamina, more magnified. *Fig.* 6. One of the pistilla laid open longitudinally. *Fig.* 7. A longitudinal section of an immature carpel. All magnified.

---

* *Mémoire*, &c. l. c.

† *Bijdragen*, &c., p. 18.

‡ *Fl. Javæ, Anonaceæ*, p. 81.

SAURAUJA BRACTEOSA, *Dec.*

TAB. XXXVI.

S. bracteosa, foliis obovato-ellipticis spinuloso-denticulatis basi subcordatis, subtùs paleaceo-pubescentibus, pedunculis axillaribus subtrichotomo-cymosis folio dimidio brevioribus, bracteis foliaceis longitudine pedicellorum.

Saurauja bracteosa, *Dec. in Mem. Soc. Genev.*, 1, p. 423, t. 6.
Saurauja gigantea, *Blume, Bijdr.*, p. 129 (nec Dec.).

Descr. Arbor, ramulis flexuosis, nutantibus, teretiusculis, cortice crassiusculo, rugoso, lenticellis hinc indè verrucoso, vestitis; novellis densè paleaceo-hirsutis, paleis (quandoque subspinulosis), ferrugineis. Folia sparsa, pollices 7—10 longa, 3—4 lata, obovato-elliptica, basi latiusculâ subcordata, apice breviter acuminata, antrorsùm per totum marginem argutè spinuloso-denticulata; suprà glaberrima, venis impressis reticulata; infrà, præsertim in nervo medio venisque primariis prominentibus, paleaceo-pubescentia; juniora utrinque ferrugineo-hirsutissima. Petiolus ferè pollicaris, crassiusculus, paleaceo-hirsutus, suprà sulcatus, post lapsum cicatricem conspicuam relinquens. Inflorescentia axillaris, tota ferrugineo-paleacea, demùm plùs minùs lævigata. Pedunculus communis 3—4 pollicaris, teres, apice gerens umbellam plùs minùs compositam, basi bracteis duâbus pollicaribus foliis omninò similibus involucratam. Pedunculi partiales subterni, parùm inæquales, semi- vel sesqui-pollicares, communi simillimi. Umbellulæ cymosæ, e pedicellis pariter subternis, inæqualibus, 3 vel 4 lineas ad pollicem usque longis, singulo basi bracteolâ instructo. Calyx 5-sepalus; æstivatione imbricativâ in alabastro subgloboso. Sepala subrotunda, acuta; 3 exteriora hirsutissima; 2 interiora paulò minora, minùs hirta. Petala 5, e disco brevi ovarii basin cingente orta, sepalis alterna, basi inter se mediante annulo angusto e filamentorum basibus connexis leviter adhærentia, calycem duplò superantia, truncato-obovata, apice emarginata. Stamina uniserialia, circiter 30, 6 nempè ante quodvis petalum; filamentis basi dilatatis annulum angustum cum petalis disco adhærentem efformantibus, dimidiam petalorum longitudinem ferè attingentibus. Antheræ majusculæ, medio dorso affixæ, oblongæ, biloculares, supernè bifidæ; loculis poro subrotundo suturam lateralem superiùs terminante dehiscentibus. Pollen minutissimum, læve, subovale. Discus ovarii basin cingens brevis, cyathiformis, e calyce liber, ovario adhærens, glaber. Ovarium densè sericeo-tomentosum, subglobosum, 4—5-loculare, polyspermum. Ovula numerosissima, placentæ magnæ fungosæ, ex apice anguli interni pendulæ, undique affixa. Styli 4—5, basi connati, supernè distincti, filiformes, stigmatibus parvis obtusis subcapitati. Capsula calyce persistente tecta, subglobosa, magni-

Tab. XXXVI.



SAURAUJA BRACTEOSA.

tudine pisi, ferrugineo-pubescens, 4—5-locularis, septis membranaceis. Placentæ ex apicibus loculorum pendulæ, seminibus numerosissimis, obovatis, mutuâ pressione parùm angulatis, in pulpâ gelatinosâ nidulantibus, undiquè tectæ. Testa nitida, castanea, fragilis, profundè et pulchrè impresso-punctata, a membranâ internâ materie gelatinosâ fasciculis raphidum acicularium repletâ discreta. Testâ remotâ, membranæ interioris margo apicalis aperturam circumdans in tubulum producta, cum fasciculo vasorum raphen efformante processum brevem conicum facilè separabilem in basi seminis constituens, e quo raphe conspicua usque ad chalazam parvam prope seminis apicem producitur. Membrana interna tenuis. Albumen semini conforme, tenerum, oleosum, copiosum. Embryo parvus, obconicus, axilis, in basi seminis; radiculâ hilo proximâ; cotyledonibus brevibus vix distinctis.

The history of the genus *Sauraujа* has been given at length by M. DeCandolle in the "Mémoires de la Société de Physique et d'Histoire Naturelle de Genève*;" and little remains to be added to what is there stated. It may, however, deserve mention that it had been generically distinguished, prior to Willdenow's publication, not only by Noronha and Leschenault in Java, and by Moçino and Sessé in Mexico, but also by Deschamps, who characterized, in his MSS., five species observed by him in Java, to which he applied the generic name of *Overstratia*, derived from that of M. Van Overstraaten, the Dutch Governor of the Island, under whose auspices he pursued his investigations. Previous to M. DeCandolle's publication, only one species, *S. excelsa*, Willd.†, collected by Bredemeyer in Caraccas, had been made known, but M. DeCandolle added no fewer than eleven, of which two were from Mexico, dependent on the drawings of Moçino and Sessé; one from Nepaul, communicated by Dr. Wallich; seven from Java, where they were collected by Commerson, Lahaye, and Leschenault, or drawn and described by Noronha; and one from the Moluccas in Mr. Lambert's Herbarium. In 1825 Dr. Blume‡ characterized nine species collected by him in Java, two of which bear the same names with the two described from Noronha's materials by M. DeCandolle; while one or two others appear to be identical with others of M. De Candolle's species. Four others, from Penang, Sylhet, Pundua, and Nepaul, in addition to the one formerly described from the last-named district, have been named in Dr. Wallich's List§. And Dr. Horsfield's collection contains several which cannot readily be referred to any of the Javanese species hitherto described. Thus we have at present nearly thirty species of a genus, common to Asia and America, but most abundant in Java, not one of which had been published at the commencement of the present century.

In establishing the genus *Saurauja*, Willdenow referred it to the family of *Tiliaceæ*‖, influenced probably by the supposed affinity which he indicates between it and *Aubletia* (*Apeiba*, Aubl.); and this reference was adopted by Jussieu¶. In the memoir just quoted, M. DeCandolle transferred it to the order *Ternstræmiaceæ* of M. Mirbel; with some doubt, however, as the seeds were unknown to him, and with a suggestion that it might form a distinct family. He consequently placed it, along with the *Palaua* of Ruiz and Pavon** (the name of which, preoccupied by Cavanilles, he changed to *Apatelia*), in a separate section of the order. These two genera, *Saurauja* and *Apatelia*, M. Kunth subsequently united; and their union has been adopted by M. Cambessèdes, who, in a memoir on the family of *Ternstræmiaceæ*, published in 1828††, states his opinion that the genera of the different sections proposed by M. DeCandolle are so linked together that it is impossible to distribute them into sections without doing violence to some of the affinities by which they are connected. In this paper the character

* Tome 1, Partie 2, 1822, p. 393 et suiv.

† *Neue Schrift. Naturf. Freunde zu Berlin*, 3, p. 406, t. 4.

‡ *Bijdr. Fl. Nederl. Ind.*, p. 126, &c.

§ Nos. 1466—1470.

‖ l. c. p. 408.

¶ *Mémoires du Muséum*, tom. 5, p. 245.

** *Prodr. Fl. Peruv.*, p. 100, t. 22.

†† *Mémoires du Muséum*, 16, p. 369, et suiv.

of *Saurauja*, which comprehends a description of its seeds, is taken from M. Kunth, and the number of its species is stated to be 17, viz. eight American and nine Asiatic.

It must be confessed that at first sight it appears somewhat paradoxical to associate *Saurauja* in the same natural family with *Ternstrœmia*, the differences in structure between the two genera being so numerous and striking. In the former we have a calyx immediately embraced by two bracteæ, which form, as it were, an integral part of the flower; adnate anthers with a lengthened connectivum; no apparent disk interposed between the calyx and ovarium; an undivided style; and an indehiscent fruit, the cells of which contain a definite number of pendulous seeds, smooth on their surface, containing little or no albumen, and having an embryo completely curved upon itself. In the latter we find the bracteæ distant, small, and inconspicuous; the anthers attached by the middle of their outer face; an evident disk for the insertion of the stamina and corolla; the styles distinct to the base or very nearly so; and a valvular fruit, with the seeds in each cell exceedingly numerous and minute, having a reticularly dotted surface, copious albumen, and a perfectly straight embryo. The leaves too, smooth and thickly coriaceous in the former, have a more membranous texture, and a peculiar somewhat paleaceous pubescence in the latter; and the flowers, which in *Ternstrœmia* are solitary in the axillæ of the leaves, form in *Saurauja* a more or less compound inflorescence, which is occasionally seated on the trunk itself.

But of the propriety of comprehending *Eurya* and *Freziera* in the same natural family with *Ternstrœmia* no reasonable doubt can be entertained after the analysis of the former by Mr. Brown* and of the latter by M. Kunth†; and the relation which both those genera, and especially the latter, bear to *Saurauja* is so close as fully to justify M. Cambessèdes in the views above noticed. In them the two floral bracteæ are less intimately connected with the calyx than those of *Ternstrœmia*; the style is divided at its apex; the seeds are indefinite and numerous, and have a similar surface to those of *Saurauja*; the albumen is considerable; and the embryo, slightly arcuate, may be regarded as intermediate between that of *Ternstrœmia* and that of *Saurauja*, approaching, however, more nearly to the latter. In habit too, *Freziera* especially, although it partakes of the general character of *Ternstrœmia*, is less remarkably distinguished from *Saurauja*.

Among the details of the two species of *Saurauja* now figured, there will be observed at the apex of the inner membrane of the seed, after the removal of the testa, and consequently at the part corresponding with the apex of the radicle, a short process to which my attention was first directed by Mr. Brown. This process consists partly of the fasciculus of vessels entering the testa and continued along the surface of the inner membrane to form the raphe, and partly of a tubular prolongation of the margin of the aperture of the inner membrane, which fills up the aperture of the testa somewhat like a cork. Similar processes are found in *Ternstrœmia, Freziera*, and other nearly related genera, but with this difference, that the raphe being in these genera adherent to the inner surface of the testa, the process in them consists entirely of the tubular prolongation of the margin of the aperture of the inner membrane. In *Freziera* this process has been imperfectly observed by M. Kunth, but having been mistaken by him for the principal vessel of the chalaza, he has, at least in one species, *F. canescens*, reversed its position, and both described and figured it as placed "ad extremitatem radiculæ oppositam." In another species, however, *F. reticulata*, he questions the position at the apex of the seed which he has assigned to this short capillary appendix, but states his materials to have been insufficient to determine the point. A careful examination of the seeds of *Freziera undulata*, and of an undescribed species of the same genus, in the Banksian Herbarium, has satisfied me that the origin and position of this remarkable process are such as I have above described; and the same facts are equally evident in the seeds of *Ternstrœmia*. Similar prolongations of the margins of the *endostome* occur in many plants belonging to very different families, but rarely assume so marked and definite a form.

---

* Abel's Journey in the Interior of China, p. 378–9.

† *Nova Genera et Species*, &c., 5, p. 163–4, t. 463.

The great abundance of the acicular crystals, or *raphides*, produced between the testa and the inner membrane of the seeds in *Saurauja*, is very remarkable, and the more so as no such productions occur in any of the neighbouring genera. It is curious also, taken in connexion with the gelatinous pulp in which the seeds are involved, and with the strikingly similar arrangement already noticed in *Freycinetia* *, where the seeds are equally immersed in a transparent pulpy mass. In *Saurauja*, however (unlike *Freycinetia* in this respect), I have not observed the raphides in any other part of the structure of the fruit.

The genus *Saurauja* has been divided by Dr. Blume † into two sections; "*Noronhianæ*, calycibus glabris," and "*Reinwardtianæ*, calycibus hirsutis;" and these, although purely artificial, and scarcely capable of strict limitation in practice, may still be retained as convenient sections. *S. bracteosa* belongs to the latter of these subdivisions, and is, I have little doubt, identical with Dr. Blume's *S. gigantea*, although not with the species adopted by M. DeCandolle from Noronha under the same name. Trivial differences might indeed be pointed out between the characters given by both authors, and those of the plant now under consideration, but these appear to me of so little moment as scarcely to deserve a passing notice. The form and circumscription of the leaves, the magnitude and composition of the axillary inflorescence, and the size and form of the large foliaceous bracteæ, are the characters which distinguish the species, and leave little doubt of its identity with the plants which I have regarded as synonymous.

In conclusion it may be well to observe that the *Ternstrœmia rubiginosa*, Jack, and *T. pentapetala*, Jack, described in the Malayan Miscellanies ‡, and adopted with doubt as species of *Ternstrœmia* by M. DeCandolle §, are unquestionably, from the detailed descriptions given in the work quoted, species of *Saurauja*; as are also the *T. acuminata*, *T. serrata*, and *T. cuspidata* of the same author described in a subsequent number of the same work ||.

"Numerous species of *Saurauja*," says Dr. Horsfield, "are noticed through the entire length of Java, as soon as the traveller reaches an elevation of about 4000 feet. They grow luxuriantly in a rich, black mould. I have traced them from the mountain *Karang* in Bantam to the furthest eastern extremity in Blambangan on all the ridges and mountains which I have visited, from the elevation above mentioned to that of about 7000 feet. They contribute much to the beauty of the vegetation of the elevated parts of the island. The species vary in size from that of small shrubs to that of trees of considerable vigour. The native name in the *Sunda* dialect, employed in the western provinces, is *Killeho*, and in the true Javanese of the eastern districts, *Umbel-Umbellan*; but the species are distinguished in both dialects by an epithet which, taken from a well-known object (as a domestic animal), indicates their relative size: *Umbel-umbellan kebo, sapi, kidong*, &c., &c." I. J. B.

Tab. XXXVI. *Fig.* 1. A branch of *Saurauja bracteosa*, of the natural size. *Fig.* 2. A flower expanded, slightly magnified. *Fig.* 3. Three of the petals, cohering by means of the stamina. *Fig.* 4. A single stamen separate, more magnified. *Fig.* 5. A transverse section of the ovarium. *Fig.* 6. Two of the paleaceous setæ, magnified. *Fig.* 7. The ripe fruit, surrounded by the persistent calyx. *Fig.* 8. The same, with the valves expanded. *Fig.* 9. One of the seeds, magnified. *Fig.* 10. The same, with the testa removed. *Fig.* 11. The embryo.

---

* v. p. 33. † *Bijdragen tot de Flora van Nederlandsch Indië*, p. 126–8. ‡ Vol. 1, No. 2, p. 39, 40.
§ *Prodromus*, 1, p. 524. || Malayan Miscellanies, Vol. 2, No. 7, p. 25–29.

SAURAUJA BLUMIANA.

TAB. XXXVII.

S. Blumiana, foliis oblongis acuminulatis calloso-serrulatis adultis glabris, pedunculis axillaribus bracteolatis 1-floris fasciculatis.

Descr. Arbor; ramulis cortice tenui rugosulo nigrescenti vestitis; novellis ferrugineo-paleaceo-hirsutis, paleis e latâ basi subspinulosis, appressis. Folia sparsa, oblonga, basi obtusiuscula, apice mucronato-acuta, antrorsùm per totum marginem calloso-spinuloso-denticulata; suprà glabra; infrà in nervo medio venisque primariis prominentibus paleaceo-hispida; novella strigoso-hirsuta. Petiolus ferè pollicaris, teretiusculus, hirtus, demùm lævigatus; delapsus cicatricem conspicuam relinquens. Pedunculi florum axillares, vel lapsu foliorum laterales, simplices, pollicares, glabriusculi, bini vel terni fasciculati, vel raró solitarii, prope basin bracteolâ unâ alterâve parvâ, ovato-lanceolatâ, instructi. Calyx 5-sepalus; æstivatione in alabastro subgloboso imbricativâ. Sepala glabriuscula; 2 exteriora ovato-lanceolata; 3 interiora subrotundo-ovata, margine plùs minùs membranacea, ciliata. Petala 5, inter se ferè usque ad medium, et basin versus cum annulo angusto e filamentorum basibus imis concretis efformato connata, obovata, emarginata, calyce duplò longiora. Stamina circiter 25, uniserialia, imâ basi inter se et cum petalorum tubo coalita, corollæ medium ferè attingentia; filamentis inæqualibus, basin versus paulùm dilatatis. Antheræ medio dorso affixæ, oblongæ, biloculares, loculis supernè discretis, poro obovato suturam superiùs terminante hiantibus. Pollen minutissimum, subsphæricum vel ellipticum, læve. Ovarium annulo brevissimo corollam et stamina gerente cinctum, ovatum, glabrum, striatum, 4-loculare; ovulis numerosissimis placentis ex apice loculorum pendulis undique affixis. Styli 4, filiformi-subulati, ad basin usquè distincti, stigmatibus parvis obtusis subcapitati. Capsula glabra, calyce persistente tecta, 4-locularis; loculis septis membranaceis distinctis. Placentæ ex anguli loculi interni apice pendulæ, seminibus subrotundo-obovatis, in materie gelatinoso-mucosâ nidulantibus, undique tectæ. Testa seminis pulcherrimè impresso-punctata, castanea, nitida, fragilis, intùs materie gelatinosâ, raphidum acicularium fasciculis creberrimis repletâ, a membranâ seminis internâ discreta. Raphe a basi conicâ parùm eminente ad chalazam parvam apicem versus ducta. Membrana interna tenuis; aperturæ margine in tubulum brevem producto. Albumen tenerum, semini conforme, oleosum. Embryo parvus, axilis, in albuminis basi, obcordatus, apice scilicet brevissimè emarginatus; radicula hilo proxima, acutiuscula.

The present species belongs to Dr. Blume's section of "*Noronhianæ*, calycibus glabris," although the calyx is



SAURAUJA BLUMIANA.

not absolutely devoid of pubescence. It even approaches, according to the published characters, so nearly to the *Saurauja Noronhiana*, Bl.*, which gives name to the section, that I was long in doubt whether it should be considered as distinct. The difference in the outline and surface of the leaves, which in that species are described as "ovalibus acuminatis—utrinque strigoso-squamulosis," have, however, determined me to regard it as new, there being no other described species with which it can be compared. In the specific designation, I have been desirous of connecting the name of Dr. Blume (who has done so much towards the elucidation of this group, both as regards its generic characters and the determination of its species) with those of his predecessors Noronha and Professor Reinwardt, already commemorated in the same genus.

I. J. B.

Tab. XXXVII. *Fig.* 1. A branch of *Saurauja Blumiana*, of the natural size. *Fig.* 2. An expanded flower. *Fig.* 3. Three of the petals, cohering by means of the stamina. *Fig.* 4. One of the stamina, magnified. *Fig.* 5. The calyx and pistillum, after the removal of the petals and stamina. *Fig.* 6. A transverse section of the ovarium, slightly magnified. *Fig.* 7. A ripe capsule. *Fig.* 8. A transverse section of the same. *Fig.* 9. Three of the seeds, enveloped in the mucilaginous pulp, magnified. *Fig.* 10. One of the seeds, separate. *Fig.* 11. The same, after the removal of the testa. *Fig.* 12. A longitudinal section of the same, exhibiting the embryo.

* *Bijdragen*, p. 126.

MUNRONIA JAVANICA.

TAB. XXXVIII.

MUNRONIA, *Wight, Ill. Ind. Bot.*, p. 147, t. 54.

CHAR. GEN. *Calyx* 5-sepalus, sepalis foliaceis, persistens. *Petala* 5, unguibus in tubum coalitis, limbo 5-partito patente. *Tubus stamineus* cum petalorum tubo cohærens, apice 10 gerens antheras, cum dentibus totidem alternantes. *Tubus interior* (discus hypogynus) membranaceus ovarium basinque styli vaginans. *Ovarium* 5-loculare, loculis 2-ovulatis. *Capsula* 5-locularis, loculis 1—2-spermis. *Semina* receptaculo centrali demum libero affixa, alâ introflexâ cincta. *Albumen* parcum. *Cotyledones* planæ.

Frutices *vel* suffrutices; foliis *impari-pinnatis.* Flores *axillares, fasciculati, vel racemosi, in pedunculo communi elongato.*

M. Javanica, foliolis 5: superioribus plerùmque sinuato-dentatis, petalorum tubo limbum duplò superante, dentibus tubi staminei simplicibus.

DESCR. Suffrutex pedalis, suberecta, vix ramosa. Radix crassa, fusiformis, radiculas plures longiusculas, diffusas, fibrillosas, hinc inde demittens. Caulis infernè nudus, teretiusculus, crassitie pennæ gallinaceæ, flexuosus, foliorum annorum præteritorum cicatricibus notatus; supernè foliosus. Folia sparsa, pinnata cum impari; foliolis lateralibus subopposititis, bijugis. Petiolus communis 2—4-pollicaris, ut et caulis pars foliosa minutè pubescens, subcylindricus, suprà striâ angustâ exaratus. Foliola omnia subtùs in nervis minutè pubescentia, suprà vix rariter et breviter pilosula; lateralia breviter petiolulata; duo inferiora quandoque paulò segregata, pollicaria, cordata, integerrima; duo superiora semper opposita, sesqui- vel bi-pollicaria, oblongo-ovata, basi (excisurâ dimidii laminæ superioris) obliquè acuta, apice obtusè parùm acuminata, integerrima, vel rariùs dente uno alterove versus apicem instructa; terminale longiùs petiolulatum, lateralibus superioribus paulò longius et latius, basi plerumque æquali magis attenuatum, apicem versus raro integerrimum, plerumque dentibus quibusdam majusculis magis minùsve profundis numerosisque instructum.



MUNRONIA JAVANICA.

Racemi pauciflori, axillares, longitudine foliorum ; pedunculo communi filiformi, minutè pubescente. Pedicelli pollicares, prope basin bracteolis duâbus minutis instructi, et illic quasi articulati. Calyx 5-sepalus, sepalis sesquilineam longis, lineari-spathulatis, apice rotundatis, foliaceis. Corolla pentapetala, petalorum unguibus in tubum longum, ferè pollicarem, angustè obconicum, connatis; limbi laciniis ovatis acutis, patentibus. Tubus stamineus longitudine fere petalorum, et cum eis ultra medium arctè cohærens, cylindricus, æqualis, gerens antheras 10, sessiles, oblongo-lineares, biloculares, connectivo prominulo breviter apiculatas, cum denticulis totidem acutis nùnc longitudine ferè antherarum, nunc brevissimis, alternantes. Tubus interior tenuiter membranaceus, duas ferè lineas longus, apice eroso-dentatus, ovarium et styli basin vaginans. Ovarium oblongo-ovatum, pubescens, 5-loculare, loculis sepalis oppositis, 2-ovulatis. Stylus cum ovario continuus, longitudine tubi staminei, filiformis, minutè pubescens. Stigma simplex, subglobosum, vix exsertum. Capsula subglobosa, depressiuscula, magnitudine pisi majoris, 5-sulcata, extùs minute pubescens, intùs glabra, nitida, 5-locularis, 5-valvis, valvis medio septiferis. Semina in quoque loculo 1 vel 2 receptaculo centrali demum soluto affixa, pendula, v. adscendentia, obovata, plano-convexa, primo intuitu quasi arillata. Testa libera, pergamentacea, nitida, undique alata, alâ latiusculâ marginibus supra raphen inflexis initio cohærentibus denique fimbriato-laceris arillum simulante. Raphe magnâ ex parte libera. Chalaza conspicua, majuscula, subrotunda. Membrana seminis interna tenuis. Albuminis residuum parcum tenue. Cotyledones planæ, foliaceæ, subrotundæ, magnitudine seminis. Radicula brevis, obtusiuscula, prominula, hilo proxima. Plumula inconspicua.

A revision of the genus *Turræa*, to which one of the species of *Munronia* has been referred*, can hardly be considered as misplaced in the present article. The former genus was established in 1771 on specimens of an Indian plant received from Kœnig, to which Linnæus† gave the name of *Turræa virens*. In 1788 Hellenius‡ described and figured two plants under the names of *T. virens* and *T. pubescens*; but the former, although received under that designation from Kœnig himself, was obviously different from the Linnean plant, and is ascertained by other specimens from Kœnig in the Banksian Herbarium to be, as Roxburgh§ has correctly stated, no other than *Limonia monophylla*, L., constituting the genus *Atalantia* of Correa. *T. pubescens*, Hellen. is, however, a genuine species of *Turræa*: the original specimens were sent by Fagræus from the Island of Hainam on the coast of China; and others are contained in the Banksian Herbarium, collected in Pulo-Condor by Mr. Haxton, the gardener who accompanied Sir George Staunton in the embassy of Lord Macartney.

In 1789, Dr. Smith figured, from the Linnean Herbarium, Kœnig's original plant, the true *Turræa virens*|| of Linnæus; and added to the genus two new species collected in Madagascar by Commerson, and obtained from M. Thouin, *T. maculata*¶ and *T. sericea***. In the following year, Cavanilles, (unaware, as it would seem, of Sir James Smith's publication,) again described and figured these two species††, of which he had seen specimens, also from Commerson, in the Herbarium of Jussieu; adding a third from the same country and collected by the same scientific traveller, communicated to him by M. Thouin. This is his *T. lanceolata*.

In 1803 Ventenat‡‡ also published a plant from the Isle of France, collected by Riche, under the name of

---

* Wallich, *Plantæ Asiaticæ Rariores*, 2. p. 21, t. 119.

† *Mantissa Plantarum Altera*, pp. 150 et 237.

‡ *Svenska Vetenskaps Academiens nya Handlingar*, 9, p. 308, t. 10, f. 1, 3.

§ *Flora Indica*, 2, p. 378.

|| *Icones Plantarum Ineditæ*, t. 10.

¶ l. c. t. 11.

** l. c. t. 12.

†† *Monadelphiæ Classis Dissertationes*, p. 360 et seqq. t. 204 et 205.

‡‡ *Choix de Plantes*, t. 48.

2 A

T. rigida; and M. Poiret*, in 1808, added, with some doubt, another which he named *T. herbacea*. On this latter M. DeCandolle observes that, from the description, it does not appear even to belong to the order; and we learn from M. Adrien de Jussieu† that it is identical with *Schwenkia Brasiliensis* of the same author.

The article *Turræa*, in Rees's Cyclopædia, published in 1819, contains a revision of the genus by Sir James Smith, who adds to it a species communicated to him by Sir Joseph Banks, collected by Brass at Cape Coast (Cabo Corso) in Western Africa, of which the Banksian Herbarium also possesses a specimen with imperfect fruit subsequently collected by Afzelius. This remarkable species he regards as a genuine *Turræa*; but with respect to *T. lanceolata*, Cav., he expresses considerable doubt. "The petals," he says, "cohere in our specimen [which, like that of Cavanilles was gathered by Commerson and obtained from Thouin], forming a tube so as to resemble some of the tubular-flowered *Ericæ*, whose stamens moreover are imitated by the pale, prominent, ribbed nectary, bearing the sessile anthers about the middle of its taper-pointed segments. This peculiar insertion of the anthers, the apparently monopetalous corolla, and our ignorance of the fruit, have always prevented our publishing this beautiful plant as a *Turræa*; but Cavanilles seems to have found the petals distinct, and we follow his example in admitting it here, though still with great scruples on account of the anthers."

In 1824, M. DeCandolle‡ enumerates the seven species of *Turræa* described by Linnæus, Hellenius, Smith, Cavanilles, and Ventenat, adding as a variety? of *T. virens*, with a suggestion that it may be a distinct species, a plant from the Indian Islands, which he designates, probably on account of having seen it in La Billardiere's Herbarium, by the trivial name of *Billardierii*.

So striking is the resemblance noticed by Sir James Smith in *T. lanceolata*, Cav., to Dryander's section A. of the tubular-flowered species of *Erica*§ (forming the genus *Ectasis* of Mr. D. Don ||), that Desvaux¶ was misled by it, in the year 1826, to describe that plant as a new genus of *Ericeæ*, under the name of *Calodryum*. It would seem that he was altogether unacquainted with its synonymy, and had no suspicion of its real affinities.

This deficiency was, however, supplied in M. Adrien De Jussieu's valuable memoir on the group of *Meliaceæ***, published in 1830, in which *Calodryum*††, recognised as a distinct genus, is restored to its true position in the immediate neighbourhood of *Turræa*. It may, however, be observed, with reference to the synonymy, that in the state in which Desvaux has described and figured the plant, it would not have been easy to recognise the *T. lanceolata* of Cavanilles. In the figure given by Cavanilles‡‡, the leaves are perfectly entire; and the petals separated to their very base: in that of M. Desvaux the leaves are so deeply sinuated as to have suggested the generic name by their resemblance to those of the oak; and the petals are united into a long and slightly 5-lobed tube. But notwithstanding these differences, M. De Jussieu, who had specimens of Cavanilles's plant in his possession, unites the two without comment; and in this he is confirmed by the specimen in Sir James Smith's Herbarium, the lower leaves of which exactly agree with those of Cavanilles's figure, while the upper exhibit evident traces of the tendency to become sinuous observed in those figured by Desvaux. Its petals also are entirely united as in the latter, differing only in having the staminal tube exserted much beyond the orifice of the tube of the corolla, whereas Desvaux describes and figures it as included. The figure of the parts of fructification given by M. De Jussieu is in some respects intermediate in character between those of Cavanilles and Desvaux, the staminal tube being exserted, and the petals only partially cohering. With reference to these characters he remarks that *Calodryum* is "a cæteris Meliaceis diversum petalis tubo stamineo brevioribus et latere variè et diù usque ad

* *Encyclopédie Méthodique*, Bot., tom. 8, p. 147.

† *Mémoires du Muséum*, tom. 19, p. 219.

‡ *Prodromus*, 1, p. 620.

§ *Hortus Kewensis*, Ed. 2, tom. 2, p. 360.

|| Edinburgh Philosophical Journal, vol. 17, p. 156.

¶ *Annales des Sciences Naturelles*, tom. 9, p. 401, t. 51.

** *Mémoires du Muséum*, tom. 19, p. 153, *et seqq.*

†† l. c. p. 217.

‡‡ *Monadelph.*, t. 205, f. 1.

apicem coalitis." As regards the diversity of character in its leaves, it may be remarked, that a similar difference, but somewhat less in degree, occurs in *Turræa heterophylla*, Sm., while *Quivisia heterophylla*, Cav.,* affords a still more striking instance in a plant also very nearly related.

In his review of the genus *Turræa*†, M. Adrien de Jussieu enumerates as genuine species *T. heterophylla*, Sm., *T. sericea*, Sm., *T. maculata*, Sm., *T. pubescens*, Hellen., *T. Billardieri*, Adr. Juss., and *T. virens*, L. Of these, the three first, or African species, form a section characterized as having an ovarium with from ten to twenty cells. This character has been observed in *T. sericea*, which has about twenty, and in *T. maculata*, which has from ten to twelve; but M. De Jussieu had not seen *T. heterophylla*, and therefore admits it into this section with a mark of doubt. It possesses, however, as well as can be judged from an imperfect fruit in the Banksian Herbarium, the character of the section. In the other section (the Asiatic, containing those which have five cells) are enumerated *T. pubescens*, *T. Billardieri*, and *T. virens*. The first and last of these M. De Jussieu had not seen: the characters of the fruit of the latter are, however, sufficiently detailed by Linnæus, and my own observations enable me to confirm the justice of the position given to the former. Those of *T. Billardieri*, which is the supposed variety of *T. virens* so denominated by M. DeCandolle, are derived from the observation of M. De Jussieu. This is the only described species of the genus, so restricted, which I have not seen: it appears, however, from the characters to be nearly related to *T. pubescens*, Hellen., and to my *T. concinna*, to be described hereafter.

The *T. rigida* of Ventenat, of which M. De Jussieu had seen specimens in Baron Delessert's Herbarium, he sets aside, as probably forming the type of a new genus approaching *Calodryum* and *Quivisia* in the structure of its staminal tube and in the position of its anthers.

Subsequently to the completion of M. De Jussieu's Dissertation, but previous to its appearance, Dr. Wallich ‡ published a plant under the name of *Turræa pinnata*, living individuals of which had been received in 1825 at the Calcutta Botanic Garden from the mountains near Sylhet, but of which unfortunately no dried specimens were contained in his collection. A living plant, however, brought by him to England and presented to the Horticultural Society, flowered in 1830, and was figured and described by Professor Lindley §, who concurred with Dr. Wallich in doubting it to be a genuine species of *Turræa*. In an additional note to his paper, M. De Jussieu refers to this plant, which he says ‖, "ne me parait appartenir ni à ce genre, ni à la tribu des Méliées. Je ne doute pas qu'il ne se place plutôt dans celle des Trichiliées, quoiqu' incertain du genre auquel on doit l'ajouter comme espèce. C'est de l'*Hartighsea* qu'il semble se rapprocher le plus par ses pétales soudés avec le tube staminal, et par le petit tube charnu qui engaine l'ovaire et la base du style."

To the genus *Hartighsea*¶, founded on a New Holland species, M. De Jussieu refers a number of plants from the South Seas and Indian Islands, most of which are still very imperfectly known, while some of them, even in the present state of our knowledge, must be excluded from it. Among these are the *Trichilia spectabilis* of Forster (*T. cauliflora*, Banks and Sol.) from New Zealand, which M. De Jussieu appears to admit with some degree of doubt, on account of its being described as 5-sepalous, and the removal of which from the genus M. Endlicher** suggests on the same grounds (the word "quinquefidum" being, I presume, a mere slip of the pen for "5-phyllum"). It differs, I may add, as the result of an examination of the Banksian specimens, from the typical species of the group (*H. Fraserana*, Adr. Juss.††), in the entire want of cohesion between the petals and the staminal tube, and consequently also of the petals *inter se* (notwithstanding the description given by Forster‡‡), and in several other characters of minor importance. The *Trichilia monophylla* of M. Achille Richard§§, which M. Endlicher suspects

* *Monadelph.* p. 368, t. 12.
† l. c. p. 217–219.
‡ *Plantæ Asiaticæ Rariores*, vol. 2, p. 21, t. 119.
§ Botanical Register, t. 1413.
‖ l. c. p. 303.
¶ l. c. p. 227.
** *Prodromus Floræ Norfolkicæ*, p. 79.
†† l. c. p. 262.
‡‡ l. c. p. 263.
§§ *Flore de la Nouvelle Zélande*, p. 306, t. 34 *bis*.

to belong to a New Holland genus that he is about to publish under the name of *Schoutensia*, does not even belong to the order in which it is placed, but is in fact, as Mr. Brown long since pointed out to me on the Banksian specimens, one of the original species of *Pittosporum*; the *P. tenuifolium* of Banks and Solander, and of Gærtner's Carpology *. Can the *Trichilia bijuga* of La Billardière, if its petals be really free from the tube, belong to this genus? or the *Hartighsea Patersoniana* of M. Endlicher, in which it is not only left doubtful whether such a union exists, but other and equally important differences are noticed, such as the "stigma subsessile lato-discoideum," and the "discus annularis basim ovarii ambiens nec illud vaginatim recipiens"—characters totally at variance with those described and figured by M. De Jussieu from the *H. Fraserana* †, and which I have found equally to exist in that plant and in his *H. Forsteri* ‡.

With the group to which these two species belong, and consequently with the true *Hartighsea*, Dr. Wallich's *Turræa pinnata* has little immediate connexion. It evidently forms a second species of the genus which I have characterized at the commencement of the present article, and is much more nearly related to *Turræa*. To illustrate the differences between the two genera, I shall here give in parallel columns the discriminative characters of each.

Turræa.	Munronia.
Calyx 5-dentatus, rarò (in *T. pumilâ*) 5-partitus, vel (in *T. tetramerâ*) 4-dentatus.	*Calyx* 5-sepalus, sepalis foliaceis.
Corolla 5-petala, petalis ab imâ basi demùm patentibus.	*Corolla* 1-petala petalorum unguibus nempè inter se et cum tubo stamineo cohærentibus nunquam sponte solubilibus.
Tubus stamineus a corollâ liber, intùs ad apicem antheras 10, vel (in *T. tetramerâ*) 8, sessiles vel brevissimè stipitatas gerens, margine (quandoque reflexo) plerùmque in dentes lacinulasve formæ variæ diviso.	*Tubus stamineus* cum petalorum tubo longè cohærens, apice intùs gerens antheras 10 sessiles vel brevissimè pedicellatas, cum dentibus totidem e tubi margine ortis alternantes.
Tubus interior nullus; sed post anthesin annulus brevissimus duplex, exterior e basibus petalorum, interior e basi tubi staminei, persistentibus, basin ovarii cingens.	*Tubus interior* membranaceus ovarium totum basinque styli vaginans.
Ovarium 5-, 10-, 20-loculare, loculis sepalis (dum numero æqualibus) oppositis, 2-ovulatis. *Stylus* tubi staminei longitudine vel longior. *Stigma* exsertum discoideum, styli dilatationem formæ variæ terminans.	*Ovarium* 5-loculare, loculis sepalis oppositis, 2-ovulatis (in *M. Javanicâ*). *Stylus* longitudine tubi staminei. *Stigma* vix exsertum, subglobosum.
Capsula 5- vel pluri-locularis, loculis 1—2-spermis.	*Capsula* 5-locularis, loculis 1—2-spermis.
Semina infra apicem suspensa, arillata.	*Semina* infra apicem suspensa, v. adscendentia, alâ introflexâ cincta.
Arbores fruticesve, foliis simplicibus integerrimis, rarò (in *T. heterophyllâ*) *obtusè lobatis, vel* (in *T. pumilâ*) *sinuato-dentatis.* Flores (*pedunculo communi abbreviato*) *fasciculati, pedicellati, vel rarò* (in *T. tetramerâ*) *sessiles.*	*Frutices vel suffrutices, foliis impari-pinnatis.* Inflorescentia (*pedunculo communi elongato*) *fasciculus* (in *M. Wallichii*), *vel racemus* (in *M. Javanicâ*) *pauciflorus.*

* tom. 1, p. 286, t. 59.

† l. c. p. 262, t. 15, f. 11.

‡ l. c. p. 265.

On a comparison of these characters it will be seen that the differences between the two genera are numerous and important, the most essential consisting in the extent of division of the calyx, the cohesion or want of cohesion of the petals *inter se* and with the staminal tube, the presence or absence of the inner tube sheathing the ovary and base of the style, the form of the stigma, and the presence or absence of a true *arillus*. These differences, taken in connexion with the dissimilar habit of the plants, are more than sufficient to justify their separation. There occur, it is true, in several points of structure intermediate or connecting forms, but by no means sufficient to invalidate the distinction. Thus, for example, the calyx of *Turræa pumila* is 5-parted, in which respect it agrees with that of *Calodryum tubiflorum*; but in neither of these plants do its divisions assume the foliaceous character of the sepals of *Munronia*; the petals of *Calodryum* are more or less cohærent *inter se*, but never with the tube formed by the union of the filaments, &c. On the characters derived from the form of stigma and the presence or absence of *arillus* I am not disposed to lay much stress; the former varying so much in *Turræa* itself as to offer good specific marks of distinction, and the latter having been observed, as regards *Turræa*, only in half-ripened capsules; while, as regards *Munronia*, the fimbriated margins which are inflected on the inner surface of the seeds, might, on an imperfect examination, be mistaken for an arillus.

In describing *Turræa*, I have been the more particular in my account of the origin of the minute annular disks surrounding the base of the ovary (which have not hitherto been noticed), because I have reason to believe that organs of similar origin have been described in other genera (as, for instance, in *Cipadessa*, Bl.*) as distinct parts; and because they might, on a superficial examination, after the falling off of the staminal tube, be considered as forming an internal ring.

M. Adrien de Jussieu† enumerates six species of *Turræa*; to these I have four new ones to add, two from Java, one from North Western India, and one from Madagascar. Subjoined is a synopsis of the species, with descriptions of those which are new, arranged, with a slight variation rendered necessary by some peculiarities in the new species from Madagascar, under the divisions proposed by M. de Jussieu.

Turræa, *L.*

* *Petala* 5. *Flores pedicellati.*

† *Ovarium 5-loculare.*—Asiaticæ.

1. *T. virens*, foliis coriaceis elliptico-lanceolatis emarginatis glaberrimis lucidis, dentibus tubi staminei linearibus acutis patentibus, stigmate vix exserto.

Turræa virens, *L.! Mant. Alt.*, p. 237. *Smith! Icon. Ined.*, t. 10.

Hab. in Indiâ Orientali ad scorias, &c., (*v. s. a Kœnig in Herb. Linn., et in Herb. Banks. ex Herb. Linn.*)

2. *T. pubescens*, foliis ovatis utrinque pubescentibus, dentibus tubi staminei bipartitis patentibus, stigmate globoso-urceolato disco latiusculo coronato longè exserto.

Turræa pubescens, *Hellen. in Nov. Act. Holm.*, 1788, p. 308, t. 10, f. 3.

Hab. in Insulâ Chinensi Hainam, *Fagræus* (*Hellen.*), et in Pulo Condor, *Haxton* (*v. s. in Herb. Banks.*).

3. *T. Billardieri*, foliis ovato-lanceolatis acuminatis junioribus pubescentibus demùm glabris,

* *Bijdragen tot de Flora van Nederlandsch Indië*, p. 162.

† *Mémoires du Muséum*, tom. 19, p. 218.

dentibus tubi staminei bifidis, stigmate obturbinato longè exserto. (Char. e Decand. et Adr Juss.)

Turræa virens β? Billardierii, *Dec. Prodr.*, 1, p. 620.

Turræa Billardierii, *Adr. Juss. in Mém. Mus.*, 19, p. 218.

Hab. in Indiæ Orientalis Insulis, *Dec.*, Java, *Adr. Juss.*

4. *T. concinna*, foliis ovatis suprà pubescentibus subtùs molliter pilosis, margine tubi staminei revoluto: dentibus fimbriato-laceris sæpè bifidis patentibus, stigmate globoso-urceolato disco latiusculo coronato longè exserto.

Hab. in Java, *Horsfield* (*v. s. in Herb. Horsf.*).

Arbor? vel frutex? Ramuli crassitie pennæ gallinaceæ, teretiusculi, longitudinaliter rugosuli, lucidi, castanei, cortice tenui, ligno albido duriusculo; novelli velutino-pubescentes. Folia alterna, membranacea, 2-pollicaria, pollicem et ultrà lata, ovata, vel quandoque elliptica, brevissimè et obtusè acuminata, basi rotundata, integerrima, junioribus utrinque villosis, adultis suprà brevissimè pubescentibus infrà mollissimè villosis. Petioli lineas 3 circiter longi, sericeo-pubescentes. Inflorescentia (pedunculo communi obsoleto) fasciculus subsessilis pauciflorus, axillaris. Pedicelli in quoque fasciculo 3—5, filiformes, pollicares, pubescentes, ad basin bracteolis quibusdam confertis ovato-lanceolatis sericeis stipati. Calyx sericeo-pubescens, turbinatus, 5-dentatus, dentibus brevibus acutis. Corolla 5-petala, in alabastro demùm clavato valvato-convoluta. Petala ad basin usque distincta, demùm patentia, lineari-spathulata, sesqui-pollicaria, e basi brevissimâ persistente intra calycis fundum reconditâ articulatim secedentia. Tubus stamineus longitudine ferè petalorum, cylindricus vel obconicus, gracilis, in ipsâ ferè basi articulatim deciduus, apice breviter in sese reflexus, dentes patentes irregulariter fimbriatas plerumque tamen bifidas et cum antheris alternantes gerens. Antheræ 10, e margine duplicaturæ tubi ortæ, brevissimè stipitatæ, oblongo-lineares, connectivo prominulo brevi-apiculatæ. Annulus duplex brevissimus, exterior interruptus ex imis petalorum basibus, interior continuus ex imâ tubi staminei basi persistente, ovarii basin post flores delapsos cingens. Ovarium subrotundum, glabrum, 5-loculare, loculis 2-ovulatis, ovulis e loculi angulo interno prope apicem pendulis, superpositis, unico tantùm (ut videtur) plerumque inferiore maturescente. Stylus filiformis, glaber, tubo stamineo in efflorescentiâ ferè sesqui-longior, apice in urceolum glabrum subglobosum disco planiusculo glanduloso (stigmate vero) coronatum dilatatus, basi articulatim secedens, apiculamque ovarii brevem relinquens. Capsula matura non visa; semimatura 5-locularis, loculis 1-spermis, seminibus pendulis infra apicem affixis, interiùs arillo adhùc incompleto semi-vestitis, infernè chalazâ conspicuâ notatis.

5. *T. villosa*, foliis ovatis suprà pilosulis subtus ferrugineo-villosis, dentibus tubi staminei obsoletis, stigmate globoso-urceolato disco latiusculo coronato longè exserto.

Hab. in colliculis minoribus sabulosis apud Dolca in provinciâ Guzerat Indiæ Orientalis, *Hove* (*v.s. in Herb. Banks.*).

Arbor? vel frutex? Ramuli divaricati, stricti, teretiusculi, longitudinaliter rugosi, castanei, denudati; novelli velutino-pubescentes. Folia citò caduca, alterna, membranacea, sesqui- vel bipollicaria, ovata, basi rotundata, apice subacuminata, integerrima; suprà saturatè viridia, pilosa;

subtùs præcipuè in nervis prominentibus densè ferrugineo-villosa. Petioli sesquilineam ad duas lineas longi, pariter ferrugineo-villosi. *Pedicelli axillares, pollicares, pubescentes, pedunculo communi abbreviato subsessiles, bini vel terni, fasciculati, ad basin bracteolis parvis confertis sericeo-villosis stipati.* Calyx campanulatus, sericeo-pubescens, 5-dentatus, dentibus parvis, ovato-lanceolatis. Corolla in alabastro demùm clavato valvato-convoluta. Petala 5, ad imam usque basin distincta, patentia, lineari-spathulata, pollicaria et ultrà, articulatione baseos imâ basi persistente caduca. Tubus stamineus petalorum ferè longitudine, subcylindricus; apice gerens antheras 10 oblongo-lineares subsessiles biloculares, nullis alternantibus laciniis distinctis; basi articulatus, delapsus imam relinquens basin persistentem. Annulus duplex brevissimus e petalorum tubique staminei imis basibus persistentibus, ovarii basin intra calycem cingens. Stylus filiformis tubo stamineo ferè sesquilongior, glaber, apice in urceolum subglobosum disco latiusculo glanduloso (stigmate vero) coronatum dilatatus. Cætera in speciminibus ob florum inopiam sectioni haud submittendis prætermissa.

6. *T. pumila*, foliis ovato-vel elliptico-lanceolatis sinuato-dentatis pilosulis, calyce 5-partito, margine tubi staminei longiùs revoluto: dentibus linearibus sursùm recurvatis, stigmate parvo globoso exserto.

Hab. in Javâ, *Horsfield* (*v. s. in Herb. Horsf.*).

Suffrutex minimus. Radix crassus, teretiusculus, 6-pollicaris, flexuosus, fragilis, radiculas fibrosas raras breves hic illic demittens. Caulis 3—6-pollicaris, crassitie pennæ corvinæ; infernè denudatus, cicatricibus foliorum annorum præteritorum notatus, glaber; supernè in parte novellâ foliosus, velutino-pubescens. Folia alterna, ovato- vel elliptico-lanceolata, sinuato-dentata, basi apiceque acuta, sesqui- ad tri-pollicaria, pollicis dimidium ad pollicem lata; paginis discoloribus, suprà saturate viridia, infrà glaucescentia, utrinque inconspicuè brevissimè pilosula. Petioli lineas 3 vel 4 longi, pubescentes. Flores axillares; vel solitarii pedicello semipollicari medio bibracteolato, vel bini ternive in apice pedunculi communis ferè semipollicaris; pedunculo pedicellisque subæqualibus 3 ad 4 lineas longis basi bracteâ unâ alterâve parvâ munitis pubescentibus. Calyx pubescens, profundè 5-partitus; laciniis lineari-subulatis. Corolla 5-petala, pollicaris et ultrà, petalis liberis, longè unguiculatis, ungue lineari, laminâ oblongo-obovatâ. Tubus stamineus cylindraceus, longitudine petalorum, apice longiùs revoluto: dentibus subulatis, sursùm recurvatis. Stigma parùm e tubo stamineo exsertum, parvum, globosum.

†† *Ovarium* 10—20-*loculare*. Africanæ.

7. *T. sericea*, foliis ovatis utrinque sericeo-villosis, floribus longissimis pendulis, calyce sericeo, dentibus tubi staminei acutè bipartitis patentibus, stigmate oblongo-lineari exserto apice tantum glanduloso.

Turræa sericea, *Smith! Icon. Ined.*, t. 12.

Turræa tomentosa, *Cav. Diss. Monad.*, p. 361, t. 205, f. 2.

Hab. in Madagascar, *Commerson* (*v. s. in Herb. Smith, a Thouin comm.*).

8. *T. maculata*, foliis ovatis utrinque glabris, floribus longissimis erectis, calyce ciliato glabro, dentibus tubi staminei linearibus acutis patentibus, stigmate . . . . . . (*in icon. Smith*) vix exserto.

Turræa maculata, *Smith! Icon. Ined.*, t. 11. *Adr. Juss. in Mém. Mus.*, 19, t. 12, f. 3.

Turræa glabra, *Cav. Diss. Monad.*, p. 360, t. 204.

Hab. in Madagascar, *Commerson (v. s. in Herb. Smith, a Thouin comm.).*

9. *T. heterophylla*, foliis obovatis integerrimis vel apicem versùs trilobis in venis utrinque pilosiusculis, dentibus tubi staminei linearibus acutis patentibus, stigmate oblongo-lineari vix exserto apice tantùm glanduloso.

Turræa heterophylla, *Smith! in Rees' Cyclop.*, *n.* 6.

Hab. in Africâ Occidentali apud Cape Coast, *Brass & Afzelius (v. s. in Herb. Banks. ex quo ad b. Smith comm.).*

** *Petala* 4. *Flores sessiles.*

10. *T. tetramera*, foliis elliptico-ovatis utrinque glabris in petiolum decurrentibus, dentibus tubi staminei nullis, stigmate longiùs urceolato longè exserto.

Hab. in Madagascar, *I. V. Thompson (v. s. in Herb. Banks.).*

Arbor? vel frutex? Ramuli in ramis alterni, plurimi, stricti, crassitie pennæ corvinæ, cortice rugoso cinerascenti plùs minùs irregulariter fisso obducti, denudati, hic illic e cicatricibus gemmarum foliorumque delapsorum prominentibus confertissimis imbricatim tuberculosi. Folia (ex unico in exemplari unico superstite) ovato-elliptica, integerrima, 2 pollices cum dimidio longa, sesquipollicem lata, basi in petiolum pariter glabrum semipollicarem decurrentia. Flores axillares, solitarii, bini vel terni, sessiles, bracteolis pluribus lato-ovatis ciliatis castaneis glabriusculis imbricatim circumvallati. Calyx sericeo-pubescens, campanulatus, 4-dentatus, dentibus parvis acutiusculis. Petala 4, pollicaria, lineari-spathulata, a basi patentia, apice extùs sericea, ab imis basibus articulatim secedentia. Tubus stamineus longitudine ferè petalorum, obconicus, apice haud dentato gerens antheras 8 subsessiles, lineares, acutas, glaberrimas, inter quarum unam alteramve tubus breviter fissus filamentorum ab invicem segregationem indicat. Annulus duplex ut in *T. concinnâ*, ejusdemque ortûs, in calycis fundo reconditus. Ovarium sericeo-pubescens, subglobosum, verosimiliter e facie externâ 4-loculare, sed deficientibus speciminibus haud ultrò examinandum. Stylus totus deciduus, filiformis, supernè glaber, apice in urceolum glabrum elongatum, disco glanduloso coronatum, dilatatus. Capsula haud visa.

The original species, *T. virens*, has a habit peculiar to itself, differing from all the rest in the coriaceous texture and shining surface of its leaves. The four following closely resemble each other, and differ only in minute characters, of which the most distinctive are afforded by the margin of the staminal tube, furnished with ten alternate spreading bifid teeth in *T. pubescens*, reflected and less regularly divided in *T. concinna*, and entire in *T. villosa*: *T. Billardieri* I have not seen, but it appears to come nearest to *T. pubescens*, from which, however, it differs, according to the characters given by M. DeCandolle, in the form of its leaves, and their ultimate freedom from hairs. The last of the Asiatic species, *T. pumila*, differs from the rest in its diminutive size, sinuated leaves, pedunculated inflorescence, and deeply divided calyx: it is possible that when its structure is better known it may

form the type of a distinct genus connecting *Turræa* still more intimately with *Munronia*, to which, notwithstanding its simple leaves, its general habit is very similar. Of the African species the two first are remarkable for their lengthened flowers; the third, *T. heterophylla*, having the shortest that are met with in the group. The latter agrees with *T. sericea*, and probably also with *T. maculata* (but in this I have not been able to verify the fact) in the linear-oblong dilatation of the extremity of the style, which is crowned with a small unexpanded glandular apex forming the true stigma: it is remarkable for the striking tendency of its leaves to become obtusely 3-lobed. The last species, *T. tetramera*, has much of the habit of the four intermediate Asiatic species, to which it also approaches in the form of the dilated apex of its style. In this respect it seems to connect them with the other species from Africa, its urceolus being much more lengthened than those of the Indian species, and tipped, like the African, by an unexpanded glandular stigma. The division of the flowers into four instead of five parts is of little moment; but their absolutely sessile character gives a different aspect to the plant. In one respect, viz. the entire absence of teeth from the margin of the *tubus stamineus*, and the slight and irregular indications of an attempted resolution of the tube into its component parts, it approaches *T. rigida* of Ventenat, which M. A. De Jussieu* regards as probably constituting the type of a new genus, and which, not having had an opportunity of observing it, I have followed his example in omitting from this group. I doubt, however, whether this want of teeth and slight tendency to a subdivision of the tube, would be sufficient to constitute a character of generic importance. The teeth we have already seen to be wanting in a species from Guzerat, *T. villosa*, so closely resembling *T. pubescens*, that were it not for this distinction and the greater length and density of the ferruginous hairs covering the under surface of its leaves, it would be extremely difficult to distinguish between them.

The distinctive characters of *Munronia* have been so fully detailed above in comparing it with *Turræa*, that it now only remains to point out the distinguishing marks of the two species with which I am acquainted.

MUNRONIA.

1. *M. Javanica*, foliolis 5: superioribus plerùmque sinuato-dentatis, petalorum tubo limbum duplò superante, dentibus tubi staminei simplicibus.

Hab. in Javâ, *Horsfield* (*vide descr. suprà*).

2. *M. Wallichii*, foliolis plerùmque 7 undulato-subrepandis, petalorum tubo limbum subæquante, dentibus tubi staminei dorso appendiculatis.

Munronia Wallichii, *Wight, Ill. Ind. Bot.*, p. 147.

Turræa pinnata, *Wall. Pl. Asiat. Rar.*, 2, p. 21, t. 119. *Lindl. in Bot. Reg.*, t. 1413.

Hab. in Sylhet Indiæ Orientalis, *Wallich.*

The characters of the latter species are taken from Dr. Wallich's figure and description. The change in the specific name (which was truly characteristic while the plant was considered a *Turræa*), is rendered necessary by its introduction into a genus, of which probably none but pinnate-leaved species will form part.

One of those deviations from the ordinary relation† of the parts of a compound pistillum to the divisions of perianthium, of which several instances are already known among dicotyledonous plants, occurs in *Munronia*. The deviation consists in the cells of the ovarium (and consequently the compound central placentæ) being placed opposite to the divisions of the calyx, and not (as in the great majority of Dicotyledones, when the number of parts is equal) opposite to the petals. This unusual relation of parts exists also in the 5-celled species of *Turræa*, in a nearly related genus from New Holland named by Mr. Brown *Leptophragma*, in *Quivisia, Sandoricum*, and *Mallea*;

* *Mém. du Mus.*, 19, p. 219.

† R. Brown, *Prodr. Fl. Novæ Hollandiæ*, 1, p. 588; and in Denham's Narrative, App. p. 236.

but the ordinary relation recurs in *Melia* and in the entire family of *Cedreleæ*, or at least in all the isomerous genera of that family which I have had the opportunity of examining, including *Swietenia*, *Soymida*, both the Asiatic and American forms of *Cedrela*, and *Flindersia*. In some cases (as for instance in *Hypericinæ*) this modification appears to be of ordinal value; but in the present instance, and in *Campanulaceæ*, it is only generic; and in a very remarkable case (*Leptospermum*) pointed out to me by Mr. Brown, both relations occur even in one and the same genus. The last-mentioned case is more especially deserving of notice, inasmuch as *Leptospermum* is only distinguishable from another genus of the same family (*Fabricia*) by the latter possessing the full complement of cells of the ovarium (that is to say a number equal to the divisions both of calyx and corolla) and thus combining both modifications in one. In *Turræa* we have a somewhat analogous instance, some of the species having an ovarium consisting of ten cells, or even, according to M. A. De Jussieu, of more.

Munronia Javanica is stated by Dr. Horsfield to be the "*Godong lema* of the Javanese." He "found it in 1805 at the furthest eastern extremity of Java. It is very rare, and was never noticed in the middle or western parts of the island." I. J. B.

Note. It was only after the present article was actually in type that I became aware that Dr. Wight had very recently distinguished the genus described in it, under the name of *Munronia*, which I have consequently adopted in place of the name previously employed by myself. The two species figured by Dr. Wight, viz. *M. Neilgherrica* (*Illustr. Ind. Bot.*, p. 147, t. 54) and *M. pumila* (*Icon. Plant. Ind. Orient.*, t. 91), are quite distinct both from Dr. Wallich's and the Javanese plant. *M. pumila*, however, which is from Ceylon, approaches most nearly to the latter, and *M. Neilgherrica* to the former.

Tab. XXXVIII. *Fig.* 1. A plant of *Munronia Javanica*, of the natural size. *Fig.* 2. A flower, slightly magnified. *Fig.* 3. The upper part of the staminal tube, with the anthers, a little more magnified. *Fig.* 4. The pistillum, with the internal sheath, surrounding the ovary and base of the style. *Fig.* 5. The ovarium, with one of its cells laid open, slightly magnified. *Fig.* 6. The ripe capsule, after dehiscence. *Fig.* 7. One of the seeds, slightly magnified. *Fig.* 8. The same, after the removal of the testa. *Fig.* 9. The embryo.

Tab. XXXIX



PHOBEROS RHINANTHERA.

T. Waddell sculp.

PHOBEROS RHINANTHERA.

TAB. XXXIX.

PHOBEROS, *Lour. Fl. Cochinchin.*, p. 317.

Scolopia, *Schreb. Gen. Pl.*, No. 846.—Limonia, *Gærtn. Fr. & Sem.*, 1, p. 278, t. 58 (*nec Linn.*).—Ludia (pars), *Roxb. Fl. Ind.*, 2, p. 567 (*nec Comm.*).—Rhinanthera, *Bl. Bijdr.*, p. 1121.—Roumea, *Wall. List*, No. 6680—1 (*nec Poit.*).—Flacourtia (pars), *Wall. List* (*nec L'Hér.*).—Dasianthera, *Presl, Reliq. Hænk.* 2, p. 90, t. 66.

CHAR. GEN. *Perianthium* 8-, 10-, 12-partitum, biseriale, persistens. *Glandulæ* totidem basi laciniarum interiorum per paria oppositæ. *Stamina* numerosa, persistentia. *Antheræ* processu linguiformi auctæ. *Ovarium* 1-loculare; placentis 3 vel 4 parietalibus, 2- vel 3-ovuliferis. *Stylus* filiformis; stigmate obsoletè 3- vel 4-lobo. *Bacca* coriacea, intùs pulpâ gelatinosâ repleta. *Semina* 2—6, funiculo longo pendente (raphe scilicet plerumque liberâ) affixa, ascendentia. *Albumen* carnosum. *Cotyledones* foliaceæ. *Radicula* supera.

Arbusculæ *v.* frutices, *spinis axillaribus armati.* Folia *sparsa, petiolata, coriacea, venosa, glabra, basi biglandulosa.* Flores *in racemis v. corymbis axillaribus paucifloris, inconspicui ; (testibus Blume et Reeves fragrantes).*

PHOBEROS *Rhinanthera,* foliis oblongo-lanceolatis acuminatis serrulatis, floribus racemosis 8- vel rariùs 10-partitis ; laciniis interioribus majoribus.

Rhinanthera (sine nom. spec.), *Bl. Bijdr.*, p. 1121.

DESCR. Arbuscula, vel frutex magnus, ramosus. Ramuli teretiusculi, glabri, cortice fuscescente ruguloso obducti, spinis validis axillaribus armati. Spinæ in ramulis ultimis simplices, acutæ, semipollicares. Folia sparsa, coriacea, glaberrima, suprà lucida, subtùs opaca, nervis tenuibus venisque vix prominulis minutè reticulata, lanceolata vel oblongo-lanceolata, acuminata, serraturis inconspicuis glanduliferis crenulato-serrata, 3—5 pollices longa, pollicem vel sesquipollicem lata. Petioli crassiusculi, semipollicares, suprà ad basin laminæ folii utrinque glandulâ parvâ subrotundâ notati. Racemi axillares, pauciflori, folium dimidium vix superantes. Flores secus racemum solitarii, vel bini aut terni ex eodem puncto orti, breviter pedicellati. Bracteæ tres ad basin cujusvis pedicelli,

minimæ, ovatæ; unica subtendente, duâbus lateralibus. Rachis pedicellique breviter sericeo-puberuli. Perianthium inferum, 8-partitum, biseriale; laciniis 4 exterioribus in æstivatione parùm imbricatis, ferè ad basin distinctis, latè ovatis, extùs puberulis, ciliatis; interioribus æstivatione imbricatis, ad basin usque distinctis, ovato-subrotundis, glabris, pariter ciliatis, duplò majoribus. Glandulæ duæ hypogynæ, subrotundæ, carnosæ, laciniæ cuique interiori oppositæ. Stamina numerosa, basi calycis vel receptaculo dilatato piloso inserta. Filamenta filiformia. Antheræ exsertæ, internè in medio affixæ, biloculares, processu oblongo obtuso loculis ipsis longiore auctæ; loculis distinctis, appositis, brevibus, extùs longitudinaliter dehiscentibus. Ovarium ovato-globosum, glabrum, 1-loculare; placentis tribus parietalibus. Ovula 2 vel 3 cuique placentæ ope funiculi brevis affixa, pendula, subovata. Stylus simplex, teretiusculus, staminibus paulò longior, fasciculis vasorum tribus percursus. Stigma obsoletè trilobum. Bacca perianthio staminibusque persistentibus suffulta, sub-globosa, magnitudine pisi, stylo apiculata, glabra; endocarpio massulis resinæ pellucidæ rufescentis repleto. Semina 2—6, subovata, mutuâ pressione plùs minùs angulata, in pulpâ gelatinosâ cavitatem implente nidulantia. Funiculus (vel potiùs raphe libera) longitudine fere seminis, e parte placentæ superiori ortus, eæque appositus vel quandoque adnatus, ad basin usque seminis descendens, ibique in hilum majusculum inferiorem expansus. Testa lævigata, cartilaginea, fragilis. Membrana interna tenuissima, chalazâ magnâ, castaneâ, subrotundâ inferiore, hilo externo respondente, notata. Albumen semini conforme, carnosum, album, copiosum. Embryo virescens, amplitudine ferè albuminis; radiculâ superâ oblongo-cylindraceâ, obtusâ; cotyledonibus tenuibus foliaceis, obsoletè venosis, subrotundis, utrinque ad marginem longitudinaliter paulùm flexis; plumulâ inconspicuâ.

The genus *Phoberos* was established by Loureiro* in 1790, on two species, the one a native of China and the other of Cochinchina; but the fruit of a species from Ceylon had been figured by Gærtner†, in 1788, under the erroneous name of *Limonia pusilla*. Schreber‡, in 1789§, corrected Gærtner's mistake as to the genus of his plant, and characterized it under the name of *Scolopia*. In Roxburgh's "Hortus Bengalensis‖," and in his "Flora Indica¶," a Sumatran species, introduced into the Calcutta Garden by Dr. Campbell, is erroneously referred to the genus *Ludia* of Commerson, under the name of *Ludia spinosa*; but the second species described in the latter place under the name of *Ludia fœtida* evidently belongs to a different genus from the first. Specimens of Roxburgh's *Ludia spinosa* were distributed by Dr. Wallich under the designation of "*Flacourtia? Stigmarota*, Wall.**"; and Loureiro's original species of *Phoberos* were at the same time referred by that distinguished botanist†† to the genus *Roumea* of Poiteau. Four other species of *Phoberos*, received from Dr. Wight, were placed by Dr. Wallich‡‡ among the species of *Flacourtia*; but these have since been restored to their proper genus by Messrs. Wight and Arnott§§, who refer that genus (as Dr. Wallich appears also to have done) to the family of *Flacourtianeæ* of Richard.

It is doubtful whether this family originated with Poiteau or Richard, by both of whom it was indicated, in 1815, in the same volume of the "Mémoires du Muséum." In characterizing his genus *Roumea* the former ob-

---

* *Flora Cochinchinensis*, p. 317. † *Fruct. et Sem.* p. 278, t. 58. ‡ *Genera Plantarum*, No. 846.

§ Although Loureiro's Preface bears date in 1788 the title page has that of 1790, so that in strict priority Schreber's name (published in 1789) should be preferred; but as *Phoberos* has been generally adopted, and *Scolopia* runs some risk of being confounded with *Scopolia*, it is perhaps better to retain the former.

‖ p. 38. ¶ 2, p. 567. ** List, No. 6678. †† List, No. 6680-1.

‡‡ List, No. 6673, g. h.; 6675, h.; and 6679. §§ *Prodromus Floræ Penins. Ind. Orient.* 1, p. 29-30.

serves that, "il semble ne s'approcher des Tiliacées que pour en tirer le *Flacourtia*, et constituer avec lui le type d'une nouvelle famille*." Of this family, however, he gives no characters. Richard, in his memoir on *Butomeæ*, in a later part of the same volume†, describes the seeds of that group as attached to reticulated veins covering the entire surface of the cavity of the seed-vessels, and adds: "parmi les Exorhizes je ne me rappelle que la petite famille des *Flacurtianeæ* qui paroisse offrir une adnexion analogue." On this indication M. De Candolle‡, in 1824, established the family of *Flacourtianeæ*, adopting for its distinctive character the remarkable attachment of the seeds described by Richard; referring to it *Ryania*, Vahl, (from which he distinguishes *Patrisia*, Kunth) *Flacourtia*, L'Hér., *Roumea*, Poit., *Stigmarota*, Lour., *Kiggelaria*, L., *Melicytus*, Forst., *Hydnocarpus*, Gærtn., and *Erythrospermum*, Lam.; and placing it next to *Bixineæ*, Kunth, to which family he refers *Bixa*, L., *Banara*, Aubl., *Lætia*, L., *Prockia*, L., *Ludia*, Comm., and *Azara*, Ruiz & Pav.

In the same year M. Achille Richard§ stated that the character derived from the attachment of the seeds, as indicated by his father, was not applicable to the whole of the genera referred to *Flacourtianeæ* by M. DeCandolle, but only to *Roumea*, *Flacourtia*, and perhaps *Kiggelaria*; and expressed his opinion that it might probably be advisable to unite the family of *Flacourtianeæ* with that of *Bixineæ*, from which it appeared to him to differ in no character of importance. This union was adopted by M. Kunth‖ in 1825, who retains for the entire group the name of *Bixineæ*. Professor Don¶, in 1831, withdrew *Azara*, Ruiz & Pavon, from *Bixineæ* to place it in *Homalineæ*; and suggested the substitution of the name of *Prockiaceæ* for that of *Bixineæ*, the genus *Bixa* being in his opinion, "an aberrant member" of the order. As the original and (as far as I am aware) only true species of *Prockia* affords a good example of the group, there seems no objection to this proposition, unless it be thought preferable to adopt for the united families (for in common with M. Achille Richard and M. Kunth I can perceive no sufficient grounds for keeping them distinct) the older name of *Flacourtianeæ*.

The intimate relation of this family with *Passifloreæ*, *Homalineæ*, and *Samydeæ* is sufficiently obvious. Of the genera enumerated by M. DeCandolle under *Flacourtianeæ*, Mr. Brown** had previously shown that *Ryania* (from which *Patrisia* seems in no respect different) belongs to *Passifloreæ*, to which order *Erythrospermum* also makes a near approach; and neither *Kiggelaria*, *Melicytus*, nor *Hydnocarpus* appear to form part of the group to which they are referred by M. DeCandolle. The retrenchment of these genera would leave only *Flacourtia* and *Roumea*; for *Stigmarota*, as Messrs. Wight and Arnott have correctly stated, is identical with *Flacourtia*. In distinguishing between *Flacourtia* and *Roumea* no reliance can be placed on the characters given by M. DeCandolle, the glandular disk supposed to be peculiar to *Roumea* existing also in *Flacourtia*, and the female calyx being frequently persistent in the latter. Their real distinction seems to consist in the ovarium, which in *Flacourtia* is distinctly plurilocular even in the youngest state in which I have been able to examine it; while in *Roumea* (according to the descriptions of M. Poiteau, M. Achille Richard, and M. Kunth) both ovarium and fruit are unilocular. I regret that I have had no opportunity of examining specimens of *Roumea*, especially with reference to the placentation of its seeds; but the description of the ovarium given by M. Achille Richard, who states it to be a "une seule loge, contenant plusieurs ovules attachés à cinq trophospermes pariétaux et linéaires," renders the apparent anomaly in the disposition of the seeds, which are said to be "attachés sans ordre à la paroi interne de la loge," a matter of very little importance. In *Flacourtia*, where the ovary and seed-vessel are divided into several distinct cells, each containing two seeds, one affixed to each side of each septum, I cannot understand how such a mode of attachment of the seeds as that attributed to it in the character of the family to which it gives name, can be supposed to exist. Neither, I may add, is its existence more obvious in *Kiggelaria*, in which also M. Achille Richard doubtfully indicates it; for in that genus (as in ordinary cases of parietal placentation) the placentæ are arranged in distinct longitudinal lines.

* *Mémoires du Muséum*, 1, p. 61.
† l. c., p. 366.
‡ *Prodr.* 1, p. 255.
§ *Dict. Class. d'Hist. Nat.* 6, p. 527.
‖ *Nov. Gen. Pl. Amer.* 7, p. 182.
¶ In Jameson's Edinburgh Phil. Journ., 10, p. 117.
** Appendix to Tuckey's Narrative, p. 439.

To the family of *Flacourtianeæ* or *Prockiaceæ*, which according to the above views comprehends, in addition to *Flacourtia* and *Roumea*, all the genera enumerated by M. DeCandolle under the head of *Bixineæ*, with the exception of *Bixa* itself, numerous additions have been made since the publication of the volume of the "Prodromus" in which they are contained. Dr. Blume*, in 1825, refers to *Bixineæ* two Javanese genera, *Echinocarpus* and *Trichospermum*, which are only known to me from his descriptions. In a later part of the same work, published in 1826, he describes, under the name of *Rhinanthera*, a genus which he regards as "accedens hinc *Rosaceis*, illinc *Capparideis* et *Flacourtianeis*," which is no other than *Phoberos*, and is founded on the species now figured. M. Kunth†, also in 1825, describes and figures a genus to which he gives the name of *Kuhlia*, but which cannot be regarded as distinct from *Azara*, intermediate gradations existing in all the trifling points of distinction noticed between the two genera‡. With regard to the last-named genus, I know not what could have induced Professor Don§ to remove it from this order and place it in *Homalineæ*, unless it be its unquestionable affinity to *Pineda*, Ruiz & Pav., and the circumstance that the latter genus had been referred by Persoon to *Homalium*, and by M. DeCandolle to *Homalineæ*. But neither *Pineda* nor *Azara* possesses the remarkable distinctive characters of *Homalineæ*, or any other which can warrant their separation from the present group.

In 1825, M. Auguste de St. Hilaire‖ excluded *Mayna*, Aubl., from *Magnoliaceæ*, to which it was referred by Jussieu, and transferred it to *Bixineæ*. But the mode of attachment of the stamina in Aublet's genus (of which only the male flowers are known) is scarcely consistent with the structure of *Bixineæ*; and it is probable that M. de St. Hilaire was misled by Raddi, who had described and figured¶, in 1820, under the name of *Mayna*, a plant very different from that of Aublet. Professor Zuccarini**, who has since described and figured the same plant, adopts Raddi's erroneous generic name, although satisfied of its incorrectness, and refers the genus with doubt to *Flacourtianeæ*, stating at the same time that Mr. Brown had verbally informed him (M. Zuccarini) that it formed part of a distinct family, including *Hydnocarpus*, Gærtn., and *Gynocardia*, Roxb. This family is the *Pangieæ* of Dr. Blume††.

In 1827 Sprengel‡‡ published a "*Fasciculus Plantarum Brasiliensium*" collected and described by M. Schott, among which is a genus named *Ascra*, placed by its author among *Guttiferæ*, but since referred by Dr. Bartling to *Bixineæ*, with which its characters decidedly agree. In his "*Genera Plantarum*§§" Sprengel refers *Ascra* with doubt to *Trilix*, L.,‖‖ a genus the characters of which are given by Linnæus from the MS. description of Mutis. The only difference between the characters given of *Trilix* and of *Ascra* consists in the "bacca 5-locularis" ascribed to the former, and the "germen 1-loculare, placentis tribus parietalibus" of the latter; and it is remarkable that these are also the only characters by which either of them appears to differ from *Banara* or *Prockia*, with which it is therefore desirable that they should be compared.

In 1831, M. Achille Richard¶¶ referred to the united family (for which he retains the name of *Flacourtianeæ* given by his father) the genus *Oncoba* of Forskåhl; but this addition is inadmissible. M. Presl***, in 1835, described three genera of *Bixineæ*, viz. *Lindackeria*, *Dasianthera*, and *Christannia*. The first of these†††, which is from Mexico, although seen only in fruit, probably belongs to the order; but this must remain doubtful until its flower is observed. *Dasianthera*‡‡‡, founded on a Luçonian species, is identical with *Phoberos*; at least I can detect no other difference than the want of the prolongation of the antheræ, which is not noticed either in the figure or description. But should the appendage to the anthers be really wanting, its absence would only serve to mo-

* *Bijdragen*, p. 56.

† *Nov. Gen. Pl. Amer.* 7, p. 182.

‡ The four American species of *Flacourtia* described by M. Kunth in the same place appear to belong to a different genus. Their characters are wholly at variance with those of *Flacourtia*, as given by the author himself.

§ In Jameson's Edinb. Phil. Journ. 10, p. 117.

‖ *Fl. Bras. Mer.* 1, p. 27.

¶ In *Memorie della Società Italiana*, 18, p. 402, f. 1.

** *Fasc. Pl. Rar.* 2, p. 55, &c.

†† *Tijdschrift von Natuurlyke Geschiedenis*, 1, p. 132.

‡‡ *Curæ Posteriores, App.* p. 407.

§§ No. 2098.

‖‖ *Mantissa Plantarum*, p. 153 et 247.

¶¶ *Floræ Senegambiæ Tentamen*, p. 32–3.

*** *Reliquiæ Hænkeanæ*, 2, p. 89, &c.

††† l. c. t. 65.

‡‡‡ l. c. p. 90, t. 66.

dify the generic character by the omission of this particular, which cannot alone be regarded as of sufficient importance to authorize the separation of one of the species of so marked a group. *Christannia** again is no other than *Pineda*; and the species described and figured, *Christannia salicifolia*, Presl, cannot be distinguished from *Pineda incana*, Ruiz & Pavon, as described by those authors and by Professor Don†.

In 1836, Professor Lindley added *Chaulmoogra*, Roxb., to *Flacourtianeæ*‡ and *Piparea*, Aubl., to *Bixineæ*§. The former was referred by Roxburgh‖ to *Capparideæ*, but it is in reality the same with *Gynocardia*, Roxb., afterwards enumerated by Mr. Lindley as a synonym of *Hydnocarpus*. Its near relation to the latter, and the circumstance of its assisting with it in forming a distinct family, have already been noticed, on Mr. Brown's authority, in the preceding page. *Piparea*, as Mr. Brown¶ long since stated, belongs to the regular-flowered section of *Violeæ*, and is not generically distinct from *Alsodeia*. In the same work Professor Lindley** refers *Rhinanthera*, Bl., to *Rosaceæ*, and places it between *Lindleya* and *Neillia* in the tribe of *Spiræeæ*.

There still remains to be added to the family of *Flacourtianeæ* or *Prockiaceæ*, one published genus, hitherto regarded as "*incertæ sedis*." This is *Xylosma*, G. Forst. (*Myroxylon*, J. R. Forst.††), which I place here on the authority of Mr. Brown. Of this genus an amended character will be found in the note below‡‡.

Several of the genera above enumerated comprehend species which appear to have been thrown into them provisionally, or from a want of the means of perfect examination. Thus *Prockia*, as adopted from Willdenow and Poiret by M. DeCandolle, is made up of species, which, although belonging to the family, are evidently very distinct in genus. Of such of these as are known to me I have given the generic characters in the note below§§, together with an amended character of *Banara*, Aubl.

The species of *Phoberos* which I have examined are nine in number, viz. *P. Chinensis* and *P. Cochinchinensis* of

---

* l. c. p. 91, t. 67.

† Under the name of *Flacourtia*, M. Presl describes two species from America which are certainly not genuine *Flacourtiæ*, and probably belong to the same genus as the plants described under the same name by M. Kunth. He describes also two species of *Prockia* as belonging to the section *Aphloia* of M. DeCandolle, but which do not seem to be referrible to either of the genera of which that section is composed.

‡ Nat. Syst. of Botany, p. 70. § l. c. p. 73. ‖ *Fl. Indica*, 3, p. 837.

¶ In Tuckey's Narrative, App. p. 441. ** l. c. p. 145. †† *Char. Gen.* t. 63.

‡‡ Xylosma, *G. Forst.*—*Flores* diœci. *Perianthium* 4—5-partitum; laciniis æstivatione imbricatis. *Discus* margine 8-, 10-glandulosus (stamina et) germen cingens. *Ovarium* 1-loculare, in stylum brevissimum attenuatum; placentis duabus 2—4-ovuliferis parietalibus. *Stigma* parùm incrassatum, obscurè bilobum. *Bacca* 1-locularis, oligosperma.—Arbores *vel* frutices *Insularum Oceani Pacifici*; foliis *reticulato-venosis*; floribus *axillaribus fasciculato-racemosis*.

§§ Banara, *Aubl.*—Flores hermaphroditi. *Perianthium* duplici serie 6-partitum; laciniis tribus exterioribus æstivatione valvatis. *Discus* glandulosus staminiferus. *Ovarium* 1-loculare; placentis 6 parietalibus. *Stylus* filiformis. *Stigma* depressum, parùm ampliatum, obsoletè 6-lobum. *Bacca* spuriè multilocularis, ex placentis inter se variè et irregulariter concretis. *Semina* numerosa, longitudinaliter sulcata, transversim rugulosa.—Arbuscula *Guianensis*; foliis *ovatis vel ellipticis, dentatis*; floribus *terminalibus, paniculatis*.

Prockia, *P. Browne.*—*Flores* hermaphroditi. *Perianthium* simplici serie 3—4-partitum, vel additis laciniis quibusdam vel totidem seriei interioris 5—8-partitum; laciniis exterioribus æstivatione valvatis. *Discus* glandulosus staminiferus. *Ovarium* 3—4-loculare, septis completis. *Stylus* filiformis. *Stigma* vix ampliatum, obsoletè 3—4-lobum. *Bacca* 3—4-locularis. *Semina* numerosa, longitudinaliter sulcata, transversim rugulosa.—Frutex *Indiæ Occidentalis et Americæ Meridionalis*; foliis *ovatis v. cordato-ovatis, acuminatis, serratis*; floribus *terminalibus in racemis paucifloris*.

From a comparison of these characters it will be seen that *Banara* differs from *Prockia* chiefly in its unilocular ovarium, and the subsequent irregular coherence of its placentæ, in their increased number and in the regularity with which the inner series of the perianthium is developed. The only species of *Prockia*, as above defined, with which I am acquainted, is the original *P. Crucis*, L.; for Sir William J. Hooker's *Prockia completa*, (*Icon. Plant.* 1, t. 94) collected by Mathews in Peru, scarcely differs from *Prockia Crucis* γ of the Banksian Herbarium from Grenada, the plant being very variable as regards the shape and serration of the leaves, the length of the petioles, the size of the stipules, and the occasional addition of the parts of the

Loureiro; *P. crenatus* and *P. lanceolatus* of Dr. Wight; *P. Wightianus** and *P. macrophyllus* of Messrs. Wight and Arnott; *P. Roxburghii* (*Ludia spinosa*, Roxb.); *P. Rhinanthera*; and a species from Hunter's River on the East Coast of New Holland, collected by Mr. Brown. To these must be added *P. Dasyanthera*, (*Dasianthera Luzonensis*, Presl.).

Phoberos Rhinanthera was found by Dr. Horsfield "in 1809, in the district of Prowoto, about twenty miles from Samarang, the capital of the medial parts of Java; and afterwards in Pajittan on the opposite side of the island, near the southern shore. In both situations it grows on low ridges about 500 feet above the ocean." Dr. Horsfield adds: "As far as I have observed, it is not common on the island. The native name is *Marong*. The stem is shrubby or subarborescent, and divides into many branches, which are again subdivided into numerous long, slender, diffuse, and deflected branchlets. The stem is strongly armed with long spines, either simple or compound, with the points diverging." I. J. B.

Tab. XXXIX. *Fig.* 1. A branch of *Phoberos Rhinanthera*, of the natural size. *Fig.* 2. A flower, magnified. *Fig.* 3. The same, with the sexual organs removed, showing the hypogynous glands. *Fig.* 4. One of the stamina, more magnified. *Fig.* 5. The pistillum magnified, with the ovarium laid open. *Fig.* 6. The berry, with the persistent calyx and stamina. *Fig.* 7. A seed, with its free raphe, or funiculus, magnified. *Fig.* 8. A longitudinal section; and *Fig.* 9. A transverse section of the same.

---

inner series of perianthium. M. DeCandolle's second species, *P. deltoides*, Lam. is only known to me from the figure and description in the "Encyclopédie Méthodique." His third species, *P. serrata*, Willd. was long since formed into a genus by Swartz under the name of *Lightfootia*: it is widely different from *Prockia*, and must be kept distinct; but as L'Héritier's genus *Lightfootia* was published in the same year, and is now generally adopted, it is necessary to give a new name to that of Swartz. The characters of the male and hermaphrodite are taken from that author, as I have only examined the female.

Thiodia, (Lightfootia, *Swartz nec L'Hérit.*)—*Flores* polygami. *Glandulæ* staminibus et germini circumpositæ, minutæ, persistentes. *Perianthium* 4-partitum, laciniis æstivatione imbricatis. *Ovarium* 1-loculare; placentis 4 parietalibus 2—3-spermis. *Stigma* subsessile, peltatum, 4-lobum. *Bacca* 1-locularis, oligosperma. *Semina* lævia.—Arbuscula *Indiæ Occidentalis*, foliis *elliptico-lanceolatis, acuminatis, serratis*; floribus *axillaribus fasciculatis, hermaphroditis et dioicis* (teste Swartzio) *in distinctis individuis*.

The two next following species in M. DeCandolle's "Prodromus" belong to another very distinct genus, for which I have adopted his sectional name *Aphloia* (under which he has also included the foregoing), derived from a peculiarity in one of the species, named by the French colonists *bois sans écorce*.

Aphloia.—*Flores* hermaphroditi. *Perianthium* 4-partitum, laciniâ unâ alterâve quandoque superadditâ; laciniis æstivatione imbricatis. *Discus* latus glandulosus staminiferus. *Ovarium* 1-loculare in stylum brevissimum attenuatum; placentâ unicâ unilaterali 10—16-ovulatâ. *Stigma* peltatum, orbiculato-emarginatum. *Bacca* 1-locularis, 8—10-sperma. *Semina* lævia.—Arbusculæ *Mascarenenses*; foliis *serratis v. subintegerrimis*; pedunculis *axillaribus solitariis v. fasciculatis*.

The great distinctive character of this genus consists in its single unilateral parietal placenta, which is described and figured by M. Bory de St. Vincent (*Voyage dans les quatre Principales Isles de l'Afrique*, 2, p. 115–6, note, and *Atlas*, t. 24.) in *Aphloia theæformis* (erroneously called by him *Ludia heterophylla*); and which I have observed in *Aphloia integrifolia*, and in an unpublished species from Madagascar in the Banksian Herbarium, collected by Mr. I. V. Thompson.

Of the species of *Prockia* "non satis notæ" enumerated by M. DeCandolle, the first, *P. lobata*, Poir. (entirely founded on the figures given in Lamarck's "*Illustration des Genres*," t. 834, under the erroneous name of *Litsea*,) bears a most striking resemblance to *Flacourtia*. M. Poiret describes it from the figures as hermaphrodite; but the figures themselves represent the male and female flowers on distinct specimens, and the plate is headed "*Diœcie*." The other species, *P.? macrostachys*, founded on one of the drawings of the "*Flora Mexicana*", is too obscure for an attempt at identification. I have already alluded in a previous note, and in an earlier part of the present, to the species since added.

* This is not, as Messrs. Wight and Arnott suspect, *Flacourtia? Wightiana*, Wall. List, No. 6672, the plant so called not belonging even to the order, but being *Antidesma Kabella*, Kœn. MSS. in Herb. Banks., which again is very distinct from *Antidesma*. *Phoberos Wightianus* is No. 6675 H. of Dr. Wallich's List.



POLYOSMA ILICIFOLIA.

TAB. XL.

POLYOSMA, *Bl. Bijdr.* p. 658.

CHAR. GEN. *Calycis* limbus superus, 4-dentatus, persistens. *Petala* 4, linearia; æstivatione valvata. *Stamina* 4, libera; antheris basi affixis, bilocularibus, loculis longitudinaliter dehiscentibus. *Ovarium* 1-loculare; placentis duabus parietalibus; ovulis numerosis. *Stylus* filiformis; stigmate simplici. *Pericarpium* indehiscens, exsuccum, pergameneum, 1-spermum. *Semen* ascendens; albumine copioso. *Embryo* parvus: radiculâ brevi, superâ, ab hilo remotâ.

Arbores aut frutices, foliis *oppositis exstipulatis*; racemis *terminalibus, rariùs axillaribus*; pedicellis *medio 3-bracteolatis*. Flores *numerosi, albidi, odoratissimi; in unicâ specie* (P. fragrans) *quandoque, sed rariùs, pentameri.*

POLYOSMA *ilicifolia*, foliis oblongo-ovalibus glabris exsertè glanduloso-dentatis, petiolis folii latitudinem ferè æquantibus.

Polyosma ilicifolium, *Bl. Bijdr.* p. 658.

DESCR. Arbor mediocris. Rami teretiusculi, juniores striatuli, cortice tenui nigricante obducti, glabri. Folia opposita, ovalia v. oblongo-ovalia, basi apiceque acuta, plùs minùs exsertè glanduloso-dentata, marginata, coriacea; suprà glaberrima, venis prominulis minutè reticulata; infrà glabra, nervo medio venisque primariis prominentibus puberulis. Stipulæ nullæ. Petioli pollicares, pubescentes. Racemus intra par foliorum summum terminalis, simplicissimus, 3—4-pollicaris; axi striatâ, pubescente. Pedicelli plurimi, conferti, pubescentes, lineas duas tresve longi, supra medium bracteis tribus minutis lanceolatis pubescentibus (quarum intermedia s. antica lateralibus paulò longior) instructi. Calycis tubus ovario adhærens, subturbinatus, pubescens; limbus 4-dentatus, dentibus patentibus lanceolatis. Corolla 4-petala; in æstivatione exactè valvata, cylindracea, obtusa, sericeo-pubescens, 6—8 lineas longa; petalis demùm usque ad basin invicem secedentibus, revolutis, linearibus, acutiusculis, subcoriaceis, 3—5-nerviis. Stamina 4, cum petalis alterna, iisque paulò breviora; filamentis filiformibus, pubescentibus; antheris filamentis vix latioribus, linearibus, basi affixis, bilocularibus, loculis introrsùm rimâ longitudinali submarginali dehiscentibus. Pollen parvum, læve, subglobosum; membranâ externâ hyalinâ per aquæ imbibitionem

ruptâ et inde abjectâ,釋internâque tunc papillulis tribus obtusis parùm eminentibus notatâ. Ovarium 1-loculare; placentis duabus parietalibus, lateralibus, loculi medium fere attingentibus sed haud invicem cohærentibus; ovulis numerosis, ascendentibus, sursùm imbricatis. Stylus e basi paulùm incrassatâ filiformis, obsoletè striatus, staminibus paulò longior, apice in stigma obtusum vix incrassatum desinens. Fructus semimaturus baccatus, ovatus, minutè pubescens, dentibus calycinis persistentibus coronatus, styli basi mucronatus, 1-locularis, 1-spermus; ovulis reliquis abortivis vix auctis in placentis parùm prominentibus persistentibus. Semen (immaturum) fructûs cavitati conforme, prope basin placentæ alterius funiculo brevi affixum, ascendens, ovatum, apiculatum; testa crassiuscula, lævis; membrana interna tenuissima; albumen copiosum. Embryo parvus, ovatus, in apice albuminis; radicula supera, obtusa; cotyledones breves, planoconvexæ.

This very distinct, and in some respects anomalous, genus was established in 1826 by Dr. Blume, who referred it to the order *Caprifolieæ*, at that time understood by him, with some restrictions, nearly in the sense in which it was proposed by Jussieu. Mr. Brown had, however, previously indicated* the separation of the true *Lonicereæ* or *Caprifoliaceæ* as a distinct family, which he has since† more precisely limited; and M. DeCandolle‡ not long afterwards elevated *Cornus*, together with certain genera which he regarded as more or less closely allied to it, into the rank of an independent order. To this order, on the authority of the characters given by Dr. Blume, he assigned the genus *Polyosma*. But M. DeCandolle appears to have overlooked, or to have doubted, the affinity pointed out by Mr. Brown§ between *Cornus* and *Marlea*, which is the more remarkable as he had seen specimens of *Marlea*, and the approximation between them is very close. On the other hand, he adopts, and with justice, Roxburgh's‖ view of the intimate connexion between *Marlea* and *Alangium*, and refers the former to the order which he had previously established for the reception of the latter under the name of *Alangieæ*¶. It appears to me, however, that these two families, although proposed by M. DeCandolle as distinct, and placed by him at a considerable distance from each other without any indication of their mutual relation, are so intimately connected that not even an artificial distinction can be made between them. In proof of this it may be sufficient to compare the characters of both as given by M. DeCandolle, and to notice the few, unessential and sometimes varying particulars in which alone the differences consist. These are, first, the number of parts in the floral envelopes, described as being from 5 to 10 in *Alangieæ*, and 4 only in *Corneæ*; but these numbers have too little constancy, (as indeed might be inferred from the wideness of the limits taken) both in *Alangium* and *Marlea* to deserve much attention, even if such a character were of general importance in other cases, and M. DeCandolle has himself referred to *Corneæ* a genus, *Mastixia*, Bl., in which they are stated to vary from four to five, which is also the case in one species of *Polyosma*. Secondly, the number of stamina, which is said to be double or quadruple that of the petals in *Alangieæ* and equal only to them in *Corneæ*; but this distinction is invalidated by the addition of *Marlea* to the former, the stamina in that genus being the same in number as the petals. Thirdly, the campanulate limb of the calyx in *Alangium*, which does not, however, exist in *Marlea* to any greater extent than in *Cornus* itself. Fourthly, the adnate anthers of *Alangieæ*; in which particular they agree with *Polyosma*. Fifthly, the unilocular ovarium of *Alangium*; but that of *Marlea* is bilocular as in *Cornus*, which it closely resembles. Sixthly, the alternate leaves of *Alangieæ*, while those of *Corneæ* are generally opposite; but to this rule *Cornus alternifolia* offers a decided exception, which renders this character, generally so important, of little value in the present group. It will readily be admitted that these distinctions are for the most part of too trivial a kind, even if clear and permanent, to justify the separation of the families; and that taken all to-

* In Abel's Narrative, p. 376.

† In Wallich's *Plantæ Asiaticæ*, I., p. 14.

‡ *Prodromus*, iv., p. 271.

§ In Abel's Narrative, p. 374.

‖ Coromandel Plants, iii., p. 79.

¶ *Prodromus*, iii., p. 203.

gether, with the qualifications above noticed, they are far too unimportant to outweigh the close agreement which exists in all the more essential points of structure of flower, fruit and seed.

In the structure of its ovarium, and that of its ripe fruit and seed, *Polyosma* differs essentially from all the above-mentioned genera. While *Cornus* and *Marlea* have a bilocular ovarium with monospermous cells and pendulous ovules, and *Alangium* has its ovarium reduced to a single cell with a similarly pendulous ovulum, the ovarium of *Polyosma* is unilocular, with two parietal placentæ, each supporting an indefinite number of ascending ovules. An approach to *Alangium* takes place only after impregnation, when all the ovules, save one near the base of one of the placentæ, cease to enlarge, and we have then a monospermous ovarium with a single ovulum, ascending, however, and not pendulous. This difference of position is likewise connected with a remarkable difference in the structure of the seed. In *Alangium*, *Marlea* and *Cornus*, the pendulous seed is furnished with a distinct raphe, and the foramen, (and consequently the radicle) is approximated to the hilum; but in *Polyosma* no such vascular prolongation of the funiculus is present, and the foramen (still placed superiorly) is at the opposite extremity from the point of attachment. Were it allowable to attempt to account for this striking disparity by conjectural reasoning, we might suppose that had it been one of the uppermost, instead of one of the lowermost, ovula that had acquired this predominance, to the suppression of all the rest, the same process might have taken place with the same result as in those genera. The direction of the cavity of the ovarium might in that case have favoured the extension of the funiculus and ovulum downwards, the ovulum might have been confluent* with its lengthened funiculus as in the other genera, and the seed of *Polyosma* might have been pendulous as in them, with a distinct raphe and a radicle approximated to the hilum. Such, however, is not the fact; the direction of the cavity being superior with reference to the attachment of the ovulum, the ovulum increases in growth upwards, and no elongation of funiculus and consequently no production of raphe takes place. In these points *Polyosma* differs widely from the family to which M. DeCandolle has referred it; and this difference is rendered still more striking by the comparatively small size of its embryo, with relation to the quantity of its albumen. The character derived from the relative position of radicle and hilum, or in other words from the relative points of insertion of the testa and inner membrane of the seed, is usually regarded as of the highest importance; but Mr. Brown† has long since shewn that cases occur in which its value is greatly diminished; and has particularly instanced that of *Zygophyllum*, in different species of which genus the radicle is placed either contiguous to, or at the opposite extremity from, the hilum, still retaining (as in the present instance) the same relative position with reference to the fruit, which seems in these cases to be of greater comparative importance.

From the foregoing observations it will be apparent, that, recognizing the force of the several objections above stated, I was unable to point out any other position for the genus *Polyosma* than that assigned to it by Dr. Blume and M. DeCandolle. But I am indebted to Mr. Brown for directing my attention to another family, with the characters of which, previous to the changes that take place in the ovarium after impregnation, it fully agrees; and to which, especially as regards the structure of ovarium, a point of great importance, it is certainly much more nearly related than to *Corneæ*. Mr. Brown proposes therefore to append *Polyosma* to *Escalloniew* notwithstanding its fruit reduced to a single seed, the large size of that seed, and the increased proportion and firmer consistence of its albumen. This approximation receives some confirmation from its resemblance in habit to *Anopterus*, a genus strictly referrible to that family.

Two species of *Polyosma* are contained in the Indian Herbarium of Dr. Wallich, and form an important addition to the three originally described by Dr. Blume. One of these, found on the Pundooah Hills on the confines of Sylhet, is altogether unpublished, but was referred in Dr. Wallich's MSS. to the genus *Glossoma* of Schreber, *Votomita* of Aublet. It appears doubtful whether this American genus, which is referred to *Corneæ* by M. DeCandolle, really belongs to that order; but I regret that the specimen from Aublet in the Banksian Herbarium is too imperfect to admit of a complete examination of its characters. There is, however, quite sufficient in the

---

* See Mr. Brown's Note, p. 112.

† In Denham's Narrative, p. 232.

specimen, as well as in the description given by Aublet, to prove that it is, as a genus, abundantly distinct from *Polyosma*. The other species, collected by Dr. Wallich at Singapore, was provisionally described by that excellent botanist as a species of *Itea*, until its proper place could be determined by the examination of its fruit. To both these species, in the Wallichian Herbarium, Mr. Brown had appended in MS. the name of *Horsfieldia*, by which, previous to the publication of the genus described in a preceding article, he had intended to designate the present group. These names are mentioned, as it is possible that some of Dr. Wallich's specimens may have been distributed under them.

Besides the Indian species, which thus extend from the confines of Sylhet through Singapore to Java, a sixth was found by Allan Cunningham in New Holland, from which the figures of the ripe fruit and seed given in the plate were taken. In Dr. Horsfield's Herbarium the fruit exists only in an immature state; in Dr. Wallich's it is altogether wanting. The following characters will distinguish the species.

1. *P. Wallichii*, foliis oblongis subtùs pubescentibus exsertè glanduloso-denticulatis.
Glossoma acuminatum, *Wall ! MSS. in Herb. Ind. Soc. Linn.*
Habitat in montibus Pundooah, Sylhet confinibus, *Wallich* (*exam. s. in Herb. Banks. et Soc. Linn.*).

2. *P. Cunninghamii*, foliis ovalibus basi attenuatis grossè dentatis glabris, petiolis folii latitudine multotiès brevioribus.
Polyosma Cunninghamii, *R. Br ! MSS.*
Habitat in Novâ Cambriâ Australi prope Five Islands, in sylvis umbrosis submontosis: arbor 12—25-pedalis, *A. Cunningham* (1818). (*exam. s. in Herb. Banks.*)

3. *P. ilicifolia*, (v. suprà).

4. *P. serrulata*, "foliis oblongis exiguè serrulatis, caule fruticoso," *Bl.*
Polyosma serrulatum, *Bl. Bijdr.* p. 659.
Habitat in Insulâ Java, *Blume.*

5. *P. integrifolia*, foliis oblongis glabris integerrimis.
Polyosma integrifolium, *Bl. Bijdr.* p. 659.
Habitat in Insulâ Java (*exam. s. in Herb. Horsf.*).

6. *P. fragrans*, foliis oblongo-obovatis v. lanceolato-cuneatis acuminatis integerrimis.
Itea? fragrans, *Wall ! in Roxb. Fl. Ind. Ed.* 1, *vol.* ii., *p.* 420.
Habitat in Insulâ Singapore, *Wallich* (*exam. s. in Herb. Ind. Soc. Linn.*).
Obs. Flores in hâc et præcedente duplò minores; in hâc quandoque, sed rariùs, 5-meri.

From Dr. Horsfield's notes I learn that the species figured is known to the Javanese by the name of *Krenyes*. "It is a tree of middling size, with a round and erect stem, the lower branches spreading horizontally and the smaller ones being slender and deflected." "I noticed it," Dr. Horsfield adds, "in one situation only, in 1814, on the Mountain Prahu, about 4000 feet above the level of the ocean, in the dense forests which cover this mountain. In the Eastern parts of Java it has not occurred to me." I. J. B.

Tab. XL. *Fig.* 1. A branch of *Polyosma ilicifolia*, of the natural size. *Fig.* 2. An unexpanded flower. *Fig.* 3. An expanded flower. *Fig.* 4. One of the petals, seen from within. *Fig.* 5. One of the stamina. *Fig.* 6. A longitudinal section of the ovarium magnified. *Fig.* 7. A transverse section of the same. *Fig.* 8. The fruit of *Polyosma Cunninghamii*. *Fig.* 9. A transverse section of the same. *Figs.* 10 and 11. Longitudinal sections of the seed. *Fig.* 12. A longitudinal section of the seed, more highly magnified, shewing the embryo.



PICRASMA JAVANICA

PICRASMA JAVANICA, *Blume.*

TAB. XLI.

PICRASMA, *Blume, Bijdr. Fl. Nederl. Ind.* p. 247.

CHAR. GEN. *Flores* diclines. *Masc. Calyx* 4-fidus. *Petala* 4, æstivatione involuto-valvata. *Stamina* 4. *Ovarii* rudimentum nullum. *Fem. Calyx* 4-fidus. *Petala* 4 persistentia, in fructu ampliata, incrassata. *Stamina* 4, antheris cassis. *Discus hypogynus* crassus, fructifer. auctus. *Ovaria* 4, libera; styli ex apicibus ovariorum in unicum coaliti; stigmata 4, linearia, revoluta; ovulum unicum, ascendens. *Drupæ* 4, v. abortu pauciores, subglobosæ. *Seminis* testa tenuis; albumen copiosum.

Arbores *Indiæ Orientalis*; foliis *sparsis, impari-pinnatis, foliolis bi- vel tri-jugis, vel quandoque ternatis.* Stipulæ *duæ, foliaceæ, caducæ.* Flores *parvi, in paniculis axillaribus divaricatim ramosis, fœminei longiùs pedicellati.*

PICRASMA *Javanica,* foliolis quinis (nunc ternatis) breviùs acuminatis integerrimis.

P. Javanica, *Blume, Bijdr. Fl. Nederl. Ind.* p. 248.

DESCR.—Arbor mediocris (*Horsf.*). Ramuli crassitie pennæ gallinaceæ, cortice fuscescente rugoso obducti. Folia sparsa, impari-pinnata; rachi 3—5-pollicari, teretiusculâ, (in sicco) striatâ. Foliola 5, integerrima, glabra, reticulatim venosa, cum rachi articulata, caduca, petiolulata; petiolulo glanduloso, lineam vel sesquilineam longo; lateralia opposita, pollicem vel sesquipollicem a ramulo ab invicem et a terminali distantia, 3—5 pollices longa, 1—1½ lata, oblongo-ovalia, acuminata, basi obtusa, quandoque supra medium paulo latiora; terminale oblongo-obovatum, acuminatum, vel subæquale vel reliquis duplò ferè majus. Stipulæ duæ foliaceæ, subrotundo-cuneatæ, obtusissimæ, radiatim venosæ, glaberrimæ, lineas circiter 4 longæ, 3 latæ, citò caducæ. Paniculæ plures axillares; pedunculo communi longitudine ferè racheos folii, teretiusculo vel complanato-angulato, glabro; ramis ramulisque divaricatis, glabris. Paniculæ masculæ pedicelli sesquilineam vel duas lineas longi: calyx parvus 4-fidus; lobis ovato-triangularibus, acutis, minutè ciliatis. Petala 4, ovata, acutiuscula, 1-nervia, glabra, æstivatione involuto-valvata, dein in corollam campanulatam vel subcampanulatam aperta.

Stamina 4, circa discum crassum villosum inserta, cum petalis alterna; filamentis subulatis; antheris medio dorso affixis, subrotundis, bilocularibus, loculis facilè ab invicem secedentibus, polline parvo lævi subsphærico repletis. Ovarii rudimentum nullum. Paniculæ fœmineæ plerumque amplioris pedicelli 6—8 lineas longi; calyx et petala ferè ut in masculis; stamina breviora; antheræ filamentis ferè æquales, cassæ. Discus hypogynus similiter villosus; ovaria 4, libera, petalis opposita, disco inserta, glabra, subglobosa, apicibus internè connata cum stylo eorundem ferè longitudine, 4-gono, 4-sulco, apice in stigmata 4, stylo subæquilonga, revoluta, linearia desinente. Ovula solitaria, prope basin anguli interni ovarii inserta, ascendentia; aperturâ (respectu ovarii) superiore. Petala fructûs persistentia, incrassata, aucta, lineas 3—4 longa, coriacea, patenti-reflexa, apice concava. Stylus post anthesin stigmatibus duplò longior, mox deciduus. Drupæ 4, vel abortu pauciores, disco aucto dissitè insertæ, subglobosæ, glaberrimæ, cicatrice parvâ subrotundâ vix conspicuâ e styli basi delapsâ intùs supernè notatæ; epidermide tenui, membranaceâ; pulpâ parcâ, carnosâ; nucleo tenui, ligneo, fragili. Semina solitaria, subglobosa, hilo oblongo latus internum ferè totum occupante affixa. Testa tenuis, lævis; raphe conspicua ab hili basi per basin seminis ad ejus faciem externam et inferiorem ducta, ibique in chalazam vasis radiantibus insignitam desinens; membrana interna tenuissima; albumen copiosum, crassum, carnosum. Embryo in seminibus mihi obviis vel imperfectus vel carie destructus, sed, ex formâ cavitatis albuminis rectus, planus, amplitudine ferè albuminis; radiculâ respectu fructûs superâ, ab hilo longiùs remotâ.

Of all known genera of plants, *Brucea* is that to which *Picrasma* makes the nearest approach. The principal differences between them consist in the considerable enlargement of the hypogynous disc of *Picrasma*; the persistence, enlargement and thickening of the petals of its female flowers; the intimate cohesion of its lengthened styles; the spherical form of its separate drupes; and the ascending direction of its ovules, the foramen of which, and consequently the radicle of the embryo, is placed superiorly, and at some distance from the hilum: while in *Brucea* the disc ceases to enlarge and the petals fall off at an early period; the styles cohere but slightly and only at their very base; the drupes are oval and pointed; and the ovules are attached just below the upper extremity of the cavities of the ovaria, to which the foramen, and subsequently the radicle, points. This last point of difference, however, although apparently great, is probably of minor importance; for in both cases there exists a raphe, longer in *Brucea*, shorter in *Picrasma*, and the positions of chalaza, foramen and radicle with reference to the fruit are nearly identical*.

---

* While this sheet is passing through the press, I have examined a species among the miscellaneous part of Dr. Wallich's collection not yet distributed, which serves still more closely to connect the two genera. It is called in Dr. Wallich's MS. *Brucea Nepalensis*, and is, I have no doubt, identical with Buchanan Hamilton's *Nima quassioides* (*Simaba quassioides*, Don, Prodr. Fl. Nepal., p. 248). This species agrees most nearly with *Picrasma*, from which it scarcely differs except in being pentamerous, in the want of the remarkable thickening of the petals of the female flowers at the advanced stage of the fruit, and in the absence of stipules. The petals, however, are persistent and slightly enlarged, the styles have a similar degree of coherence, the drupes are of a rounded form, and the ovules are attached near the base of the ovaries; in all which respects it differs from *Brucea* and agrees with *Picrasma*. It seems desirable therefore to suppress the genus *Nima*, and to modify the character of *Picrasma* so as to comprehend this species, with the following characters:

Subgenus NIMA. *Flores pentameri; petala haud incrassata; stipulæ nullæ.*

P. (NIMA) *quassioides*, foliolis 9—15 ovali-oblongis acuminatis serratis.

I presume that the specific name is intended to indicate a similarity, not of habit, but of properties, this species being, like the others, intensely bitter in all its parts.

The genus *Brucea* (although variously ascribed to John Frederic Miller, L'Héritier, or Lamarck) was named by Sir Joseph Banks from garden specimens of the Abyssinian species, produced from seeds brought to Europe by the celebrated traveller whose name it bears. It was first published in 1779 in Miller's "Icones," t. 25; to which work L'Héritier, who again figured it in his "Icones Selectæ," p. 19. t. 10, published in 1784, refers, changing, however, the specific name of *antidysenterica* given by Banks and Solander to *ferruginea*, which was subsequently adopted in "Hortus Kewensis." Lamarck* in 1783 added a second species, for which he adopted the name of *paniculata* given to it in the Banksian Herbarium; but of this only the male flowers, brought from Sierra Leone by Smeathman, are yet known, and it is consequently doubtful whether it really belongs to the genus. A more genuine addition was made to it by Roxburgh†, who referred to it, under the name of *Brucea Sumatrana*, the *Lussa Radja* of Rumphius‡, which has long been recognized as identical with *Gonus amarissimus* § of Loureiro.

Two other of Loureiro's genera, which are still known only by his descriptions, have been by different writers referred to *Brucea*; but both of these belong, or are intimately related, to *Xanthoxylum*, in the extended sense given to that genus by M. Kunth ||. These are *Tetradium* and *Lepta*; the former of which was first suspected by Jussieu¶ to be an hermaphrodite species of *Brucea*, and afterwards** stated, on the same great authority, to be so near to it that the two genera ought to be united; while the latter was first described in Dryander's MSS. from Loureiro's specimens under the name of *Brucea trifolia*, although afterwards justly noted by him to be "not a *Brucea*, but of the family of true *Rutaceæ*."

Of both these supposed genera, *Lepta* and *Tetradium*, I have examined specimens in the Banksian Herbarium from Loureiro himself. Of the latter Sir James Smith ††, after referring to Jussieu's opinion (which he attributes to De Théis) that it is allied to *Brucea*, adds, "we think also it is evidently very near *Fagara*: in deference to the weighty authority of Jussieu, we have, not without doubt, referred it to his Natural Order of *Terebinthaceæ*; but it appears rather to belong to his imperfectly defined one of *Rutaceæ*." This assumption, founded solely on Loureiro's description, is established by the examination of his specimens, which have diœcious and not hermaphrodite flowers, and all the other characters of the genus *Xanthoxylum*, including *Fagara* as proposed by M. Kunth. Jussieu's opinion of the affinity of *Tetradium* to *Brucea* has been adopted by DeCandolle ‡‡ and by his son §§.

Lepta also exhibits, both in its male and female flowers (for it, as well as *Tetradium*, is diœcious, and not, as would be inferred from Loureiro's description, hermaphrodite), all the characters of *Xanthoxylum*. Its four ovaries are slightly coherent at the apex, and each of them contains two collateral ovules attached near their middle, one of which appears to be constantly abortive; but as I have had no opportunity of examining the fruit, I cannot determine whether it be, as Loureiro has described it, baccate. Were this description correct, it would indicate a distinction from *Xanthoxylum* which no other part of the structure warrants; but I am strongly inclined to believe that the plant is identical with *Ampacus angustifolia* of Rumphius||||, and with *Fagara triphylla* of Lamarck¶¶ and Roxburgh***. Both these last-named authors, it is true, describe (like Loureiro) the flowers as hermaphrodite, and have thus misled DeCandolle††† into regarding it as a species of *Euodia*; but this error has been corrected by Dr. Wight‡‡‡. The genus *Lepta*, thus closely approximated to *Xanthoxylum*, has been hitherto most singularly bandied about by various authors, having been referred by Jussieu to *Skimmia*, Thunb., next to which it has been placed by DeCandolle at the end of his Aquifoliaceous tribe of *Celastrineæ*; by Poiret §§§ to *Othera*, Thunb.,

* *Encyclopédie Méthodique, Botanique*, i. p. 472.

† *Flora Indica*, Ed. 1832, i. p. 449.

‡ *Herbarium Amboinense, Auctuarium*, p. 27, t. 15.

§ *Flora Cochinchinensis*, p. 658.

|| *Nova Genera et Species Plantarum Americanarum*, vi. p. 1.

¶ *Encyclopédie Méthodique, Botanique*, vii. p. 603.

** *Ibid. Suppl.* ii. p. 815.

†† Rees's Cyclopædia, *in voce*.

‡‡ *Prodromus*, ii. p. 88.

§§ *Mémoires du Muséum*, xii. p. 520–1.

|||| *Herbarium Amboinense*, lib. iii. p. 188, t. 62.

¶¶ *Encyclopédie Méthodique, Botanique*, ii. p. 447.

*** *Flora Indica*, i. p. 416.

††† *Prodromus*, i. p. 274.

‡‡‡ Illustrations of Indian Botany, i. p. 164.

§§§ *Encyclopédie Méthodique, Botanique, Suppl.* iii. p. 33.

or *Orixa*, Thunb., both which genera he regards as "parfaitement semblables;" by Sir James Smith* to the Natural Order *Vites*, with the observation that "its habit very much resembles that of *Cissus*, but the character of its fruit appears to be essentially different;" and finally by Sprengel to the genus *Ilex*†.

While thus restoring to *Xanthoxylum*, or its immediate neighbourhood, the plants described by Loureiro under other generic names, it may be as well to notice his *Fagara piperita* ‡ and *Xanthoxylum Clava Herculis* §. Of the former no specimen exists in the Banksian Herbarium; but it is evident from Loureiro's description that it is a genuine species of *Xanthoxylum*, and equally so that it is widely different from the Linnean plant. Dr. Wallich || is probably right in regarding it as identical with Roxburgh's *Fagara nitida*. *Xanthoxylum Clava Herculis*, Lour., is also evidently misnamed. The flowers described as hermaphrodite are probably male; female flowers alone are found on the specimens from Loureiro in the Banksian Herbarium, and these have a 5-parted calyx, 5 petals, no rudiments of stamina, and two ovaria closely applied to each other and surmounted by an almost sessile, broad, circular, peltate stigma, each containing two collateral ovules, and showing manifest indications of dehiscence in a more mature state. It constitutes apparently a genus distinguished from *Xanthoxylum* by the want of sterile stamina in its female flowers, and its subsessile peltate stigma. In the latter character it approaches the Chinese genus *Boymia*, as described by M. Adrien de Jussieu ¶, but differs in the reduced number of its ovaria and in its collateral ovules.

Besides *Brucea antidysenterica* and *Sumatrana*, DeCandolle** has characterized a third species (*Ailantus gracilis*, Salisb. Prodr. Hort. Chapel-Allerton, p. 171) under the name of *B. gracilis*; but I am quite unable, on comparison of a specimen from Salisbury himself, to detect any difference between it and *B. Sumatrana*. DeCandolle omits Salisbury's synonym of *Rhus Javanica*, L., for this plant; which is, however, quite correct so far as regards the specimen in the Linnean Herbarium so marked by Linnæus himself; but there is also a specimen of a true *Rhus* (*R. Javanica* of authors) pinned on to the specimen of *B. Sumatrana* thus misnamed. I am strongly inclined to believe that M. DeCaisne's *Brucea glabrata* †† is only a slight variety of *B. Sumatrana*.

The position of *Brucea* and *Picrasma* in the Natural System is not easily to be determined. Jussieu ‡‡ originally referred *Brucea* to *Terebinthaceæ*, forming a distinct section of that order for its reception in company with *Simaba*, Aubl., and *Ailantus*, Desf. M. Kunth §§ in 1824 placed it, along with *Brunellia* of Ruiz and Pavon, in his "genera Connaraceis affinia;" and in the following year DeCandolle |||| adopted this view, arranging the genus among *Connaraceæ*, which he regarded only as a tribe of *Terebinthaceæ*. In the same year, M. A. de Jussieu ¶¶ transferred it to that subdivision of the family of *Rutaceæ* which he has separated under the name of *Xanthoxyleæ* from the *Diosmeæ* of Mr. Brown. And lastly, Messrs. Wight and Arnott*** have referred it, together with *Ailantus*, to a suborder of *Xanthoxyleæ*, to which they have given the name of *Ailantheæ*, and which they regard as distinguished from the more strictly Xanthoxyleous genera by their depressed hypogynous disc, uniovulate ovaria, indehiscent drupaceous fruit and straight embryo.

An argument in favour of these latter views might be derived from the circumstance of so many plants belonging to or related to *Xanthoxylum* having been erroneously referred by different writers to the genus *Brucea*; but this argument carries little weight, inasmuch as neither these plants nor *Brucea* itself were sufficiently known to the authors by whom they were thus confounded; and it appears to me that the indehiscent drupaceous fruit, uni-

* Rees's Cyclopædia, *in voce*.

† *Systema Vegetabilium*, i. p. 496.

‡ *Flora Cochinchinensis*, p. 80.

§ *l. c.* p. 659.

|| *Roxb. Fl. Ind. Ed. Wall.*, i. p. 440.

¶ *Mémoires du Muséum*, xii. p. 507.

** *Prodromus*, l. c.

†† *Herbarium Timorense, in Nouv. Ann. du Mus.*, iii. p. 447, t. 20.

‡‡ *Genera Plantarum*, p. 373.

§§ *Annales des Sciences Naturelles*, ii. p. 362.

|||| *Prodromus*, l. c.

¶¶ *Mémoires du Muséum*, xii. p. 501.

*** *Prodr. Flor. Penins. Ind. Orient.*, i. p. 150, and Illustrations of Indian Botany, i. p. 169.

ovulate ovaria and membranous testa of the seeds of *Brucea* and *Picrasma* are characters of too great importance to allow of their being intimately associated with *Xanthoxylum* and its immediate allies. Nearly the same objections apply to arranging them with *Connaraceæ*; and I must confess that I know no better place for them than in the neighbourhood of *Simarubeæ*. With the plants of this family they agree in the enlarged receptacle of their fertile flowers, the complete separation of their ovaria with more or less coherent styles, their solitary ovula, indehiscent drupes, seeds furnished with a membranous testa, and inverted embryo, as well as in habit and in the bitterness of all their parts. The principal points in which they differ are the absence of scales at the base of their stamina, which are only equal in number to the petals, and the presence of albumen in their seeds; but these distinctions are not apparently of great importance. Similar scales accompany the stamina of many *Diosmeæ*, and are wanting in others; the number of stamina in *Ailantus* (which seems to be justly associated with *Brucea*, notwithstanding its samaroid fruit) is double that of the petals, as in *Simarubeæ*; and the albumen, which is copious in *Picrasma*, is much less abundant in *Brucea*, and is reduced to a thin coat in *Ailantus*. I am far, however, from being satisfied with appending these genera to *Simarubeæ*, although I have little doubt that they are more nearly related to that family than to *Connaraceæ* or *Xanthoxylum*.

A second species of *Picrasma* is contained in Dr. Wallich's East Indian Herbarium: it is thus referred to in his 'List,' under No. 7499, "Brucea? arbor fol. altern. pinnat. nunc ternatis, foliol. lanceol. acuminat. marginatis, flor. cymosis, ligno amaro. (R.B.) Napalia, 1821." So near is the approach between this species and *P. Javanica*, that I am unable to point out any more important distinctions than such as relate to the number and slightly modified form of the leaflets. The number in Dr. Wallich's species appears, from the above short description, to be sometimes reduced to three as in the Javanese, but I have never seen the Javanese with so many as seven leaflets, which seems to be the ordinary state of the Nepaul plants. The latter may be distinguished as

Picrasma Nepalensis, foliolis septenis (nunc ternatis) longiùs acuminatis integerrimis.
Brucea? arbor, &c., *Wall. List, No.* 7499.
Hab. in Nepaliâ, *Wallich* (*Exam. sicc. in Herb. Ind. Soc. Linn.*).

Picrasma Javanica was first found by Dr. Horsfield "in 1804 in the Preangan Regencies, and subsequently near Ungarang and in other parts of the island. It is everywhere known to the natives as an intense bitter: in the western parts of Java its name is *Ki-pait*, literally *bitter-wood*; in the eastern parts *Patty-lallar*, or *fly-bane*. It is used as a remedy against worms and in cutaneous eruptions." Dr. Horsfield has given, in the eighth volume of the "Transactions of the Batavian Society," some account of its medical properties. "It is," he there says, "a tree of middling size, and all its parts are impregnated with a bitter taste resembling that of the *Fraüalot* (*Brucea Sumatrana*); it depends on future trials to determine how far the two species agree in quality and effects."

I. J. B.

TAB. XLI. *Fig.* 1. A branch of *Picrasma Javanica*, bearing male flowers, of the natural size. *Fig.* 2. A branch of the female panicle. *Fig.* 3. A male flower, before opening, slightly magnified. *Fig.* 4. One of the stamina. *Fig.* 5. A male flower, expanded. *Fig.* 6. A female flower. *Fig.* 7. The same with the petals removed. *Fig.* 8. One of the ovaries, cut open to show the attachment of the ovulum. *Fig.* 9. The ripe fruit, of the natural size. *Fig.* 10. The same with three of the drupes removed. *Fig.* 11. The calyx and corolla of the ripe fruit seen from below. *Fig.* 12. One of the drupes, cut open to show the attachment of the seed. *Fig.* 13. The seed.

LASIOLEPIS PAUCIJUGA.

TAB. XLII.

LASIOLEPIS.

CHAR. GEN. *Calyx* 5-partitus. *Petala* 5, æstivatione involuto-valvata. *Stamina* 10, basi intùs aucta squamulis totidem semiaccretis. *Discus hypogynus* crassus, cupuliformis. *Ovarium* 5-loculare, ovulis solitariis suspensis. *Stylus* simplex, stigmate depresso crassiusculo obsoletè 5-lobo. *Drupa* subglobosa, 2—5-pyrena. *Semen* suspensum (exalbuminosum?), processu membranarum interno septiformi in loculos duos incompletos semidivisum. (*Embryo* verosimiliter conduplicatus.)

Frutices *Insularum Indiæ Orientalis*. Rami ramulique *spinis* (*stipularibus?*) *armati*. Folia *sparsa, impari-pinnata, petiolo communi sæpè alato, foliolis oppositis articulatim deciduis*. Flores *corymbosi, ramulos ultimos terminantes*.

LASIOLEPIS *paucijuga*, foliolis 3—4-jugis.

Frutex, trunco brevi spinis brevibus densè armato (*Horsf.*). Rami virgati, subcylindrici, cortice glabro fusco-cinerascenti obducti, crassitie pennæ anserinæ. Ramuli breves, siccitate anguloso-sulcati, juniores fusco-puberuli. Folia alterna, impari-pinnata, 2—4-pollicaria, 3—4-juga; petiolo communi puberulo, infrà rotundato, suprà sulcato, subarticulato, inter foliolorum paria duo ultima (præcipuè in foliis magis evolutis) latiusculè alato; foliolis oppositis, subsessilibus, pollicaribus vel sesquipollicaribus, obliquè ovatis vel ovato-lanceolatis, basi apiceque acutis, integris vel crenatis, utrinque nisi in nervo medio glabris, junioribus quandoque puberulis. Spinæ (stipulares?) in parte ramorum inferiore ramulos stipantes binæ, breves, aduncæ vel paulò reflexæ; in parte superiore unâ alterâve tantùm superstite vel plerumque utrâque obsoletâ, ramulis squamulis quibusdam minutis ad basin circumdatis. Stipulæ foliorum ramulorum inconspicuæ vel nullæ. Inflorescentia ramulos terminans subcorymbosa, 8—20-flora, rachi ramulis 2—3-floris pedicellisque puberulis, pedunculis aliis quibusdam in axillis foliorum supremorum 2—3-floris; bracteolis inconspicuis vel nullis. Calyx parvus, quinquepartitus, extùs puberulus; laciniis subtriangularibus acutis. Petala



LASIOLEPIS PAUCIJUGA.

5, hypogyna, æstivatione involuto-valvata, utrinque sed extùs præcipuè minutè puberula, ovali-lanceolata, uninervia. Stamina 10, hypogyna, basi aucta squamulâ interiore ovali, obtusâ, villosissimâ, ultra medium liberâ, filamento triplò latiore, quadruplò breviore; filamenta filiformia, glabra, petalis longiora, alterna (laciniis calycinis opposita) paulò longiora; antheræ ovales, dorso infra medium affixæ, biloculares, longitudinaliter dehiscentes, polline lævi sphæroideo repletæ. Discus crassus carnosus cupuliformis, ovarium ferè ad medium ambiens et cum êo cohærens. Ovarium subglobosum, glabrum, 5-loculare; loculis vix ultra disci marginem infernè productis, 1-ovulatis. Ovulum funiculo brevissimo infra apicem affixum, ex angulo loculi interiore suspensum; aperturâ (respectu loculi) superiore. Stylus filiformis, crassiusculus, infernè pilis simplicibus villosus; stigmate crassiusculo obsoletè quinquelobo. Drupa subglobosa, magnitudine cerasi minoris, glabra, sarcocarpio copioso coriaceo, calyce persistenti basi suffulta; fœta nucleis 2—5 subovatis, parùm lignosis, intùs lævissimis, sub apice ad latus internum foramine majusculo perforatis. Semen solitarium fasciculo vasorum per nuclei foramen descendente hilo majusculo affixum. Testa crassiuscula, pergamenea, castanea, minutissimè punctulata, intùs munita dissepimento crassiore ferè ligneo ex apice inter hilum et chalazam versus basin seminis descendente et cavitatem in loculos duos incompletos anticum et posticum ferè bipartiente. Membrana interna tenuis testam ejusque processum septiformem undique intùs vestiens, chalazâ subrotundâ ad apicem cavitatis anticum (exteriorem) notata. Albumen verosimiliter nullum. Embryo in seminibus immaturis imperfectè visus, ex formâ membranarum cavitatis dispositioneque relativâ hili atque chalazæ, medio infernè verosimiliter conduplicatus.

Lasiolepis appears to me to be closely allied to *Harrisonia*, R. Br., described and figured by M. A. de Jussieu* and M. Gaudichaud†, and to have no other near affinity. It agrees with that genus in almost all the more essential parts of its structure, viz. in its calyx and petals and their æstivation; in its stamina and their internal basal scales; in its undivided ovary and style; in its simple capitate stigma; in its drupaceous polypyrenous fruit; in its perforated nuclei; in its solitary pendulous ovulum and seed; and in the remarkable partial subdivision of the cavity of its seed by the folding in of the enveloping membranes; as well as in its shrubby habit, compound leaves, stipulary (?) thorns and inflorescence. The chief differences between them consist in the number of parts (four and eight in *Harrisonia*, five and ten in *Lasiolepis*); in the cup-shaped enlargement of the hypogynous disc in *Lasiolepis*; in the circular (not lobed) outline of its ovarium; in the simplicity of its style down to the very base, leaving on the nearly spherical drupe a single terminal cicatrix, instead of the four remote cicatrices produced by the falling off of its component parts in *Harrisonia*; in its much more copious coriaceous sarcocarp; and in its pinnate (not trifoliolate or simple) leaves. Another difference would appear from the descriptions of M. A. de Jussieu and M. Gaudichaud, to exist in the dehiscent nuclei of *Harrisonia*, characterized by the former as "nuculamenta demùm bivalvia," and by the latter as "fructus apice loculicido-quadrivalvis"; but I have not myself been able to observe, even in the ripest fruits of that genus that I have seen, any trace of such a dehiscence.

The affinity of these two genera to *Simarubeæ*, to which *Harrisonia* is appended by M. A. de Jussieu, appears unquestionable, although not so close as to admit of their being absolutely referred to it. They agree with that family in calyx, petals, stamina (twice as many as the petals) with their internal partially adherent basal scales, plurilocular ovary, simple style, solitary pendulous ovulum, exalbuminous seed, radicle superior with reference to

---

* *Mémoires du Muséum*, xii. p. 517 and 540, t. 28, f. 47. † *Voyage de Freycinet, Botanique*, p. 478. t. 103.

the fruit, and articulated compound leaves; but differ from it in their undivided ovary, in their polypyrenous drupe, and in the singular partial subdivision of their seminal cavity, together with the consequent conduplication of their flattened cotyledons. *Harrisonia*, however, has the style at its base soluble into its component parts as in the true *Simarubeæ*, and its fruit is also at maturity deeply lobed and separable without much difficulty. If the thorns which are generally found in both at the base of the petioles are truly stipulary, they would afford another ground of distinction between these genera and *Simarubeæ*; but the evidently close affinity between *Picrasma*, described in the last article as having large stipulæ, and *Brucea* which has none, affords one proof among many of the small consideration to be attached to the presence or absence of those organs in some cases, notwithstanding their almost paramount importance in others.

Lasiolepis paucijuga was found by Dr. Horsfield "in 1804, about fifteen miles south of the capital Samarang, on the acclivities of the Mountain Ungarang, and subsequently at Banyu Wangie at the eastern extremity of Java. The Javanese name is *Keng-keng* or *Rung-keng*. The stem is shrubby and subdivided near the earth into numerous virgate inclining branches, which, as well as the stem, are densely armed with short spines."

The same species has been collected in the island of Luzon by Mr. Cuming, who also found a second species in Mindanao, differing chiefly in the much greater number of its leaflets. They may be thus distinguished.

Lasiolepis paucijuga, foliolis 3—4-jugis.

Hab. in Insulâ Java ad Montem Ungarang et apud Banyu Wangie, *Horsfield*; in Insulâ Luzon Philippinarum, *Cuming*, No. 1150.

Lasiolepis multijuga, foliolis 9—12-jugis.

Hab. in Provinciâ Misamis Insulæ Mindanao Philippinarum, *Cuming*, No. 1655.

I may add to the habitat of Timor, hitherto the only one recorded for *Harrisonia Brownii*, that Mr. Brown found it also on the north coast of New Holland, and that Mr. Cuming collected it in the islands of Zebu and Bohol, two of the Philippines, and distributed it under his numbers 1780 and 1828. I. J. B.

Tab. XLII. *Fig.* 1. A branch of *Lasiolepis paucijuga*, of the natural size. *Fig.* 2. A flower, slightly magnified, with the petals turned back. *Fig.* 3. Two of the stamina, with their internal basal scales. *Fig.* 4. The pistillum, with its hypogynous disk. *Fig.* 5. A vertical section of the ovarium, laying open two of its cells, and showing the attachment of the ovula. *Fig.* 6. A transverse section of the ovarium. *Fig.* 7. The nearly ripe fruit, of the natural size. *Fig.* 8. One of the nuclei, separated from the sarcocarp, and showing its perforation. *Fig.* 9. A vertical section of the same, showing the immature seed.



PANGIUM EDULE

PANGIUM EDULE, *Reinw.*

TAB. XLIII.

PANGIUM, *Reinw. in Syll. Plant. Soc. Ratisb.* ii. p. 12.

CHAR. GEN. *Flores* dioici. *Calyx* 2—3-sepalus, sepalis concavis. *Corolla* 5- vel 6-petala. *Squamæ* totidem, sericeo-villosæ, petalis oppositæ, iisque triplò breviores. *Masc. Stamina* numerosa (20—25); filamenta crassa, supernè dilatata; antheræ ovales, medio dorso affixæ. *Ovarii* rudimentum nullum. *Fœm. Filamenta* (stamina sterilia) tot quot petala iisque alterna, subulata. *Ovarium* superum, ovatum, uniloculare; ovulis numerosis placentis duabus parietalibus affixis. *Stigma* sessile, planum, obsoletè 2-, 3-, 4-lobum. *Capsula* baccata, indehiscens, unilocularis, polysperma. *Semina* variè angulata, in pulpâ nidulantia (pericarpii parieti internæ 4-fariam, teste Reinwardt, inserta); hilo maximo; testâ durissimâ, rugis crassis protuberantibus ramosis undique asperatâ. *Albumen* copiosum, oleosum. *Embryo* amplitudine ferè albuminis; radiculâ cylindricâ, hilo proximâ; cotyledonibus planis, foliaceis, multinerviis.

Arbor *excelsa*; foliis *sparsis, cordato-ovatis v. subrotundis, quandoque trilobis, integerrimis*; petiolis *longis, apice refractis*; floribus *axillaribus*, masculis *in racemis paucifloris*, fœmineis *solitariis longè pedunculatis*; fructu *ovato, maximo*; seminibus *maximis.*

PANGIUM *edule*, Reinw. in Syll. Plant. Soc. Ratisb. ii. p. 13.

Pangium, *Rumph. Herb. Amb.* ii. p. 182, t. 59.
Cloak, Kloak v. Clobak, *Radem. Beschr. Plant. Jav.*, p. 21. *Ejusd. Byvoegz.*, p. 52, *alibique.*

DESCR.—Arbor excelsa. Ramuli crassi, juniores rufo-pubescentes, cicatricibus foliorum delapsorum magnis subcordiformibus notati. Folia maxima; arborum juniorum (teste Rumphio) sæpè triloba lobis acutis, vel lobo uno alterove obsoleto obliquè biloba vel integra; adultarum cordato-ovata vel

subrotunda, acuminata, integerrima, pollices 6—15 longa, 4—10 lata, suprà glabra nitida, subtùs in nervis venisque præcipuè densè rufo-pubescentia, basi 5—7-nervia, nervisque lateralibus utrinque circiter 4, venis venulisque creberrimis anastomosantibus pulchrè reticulata. Petioli 6-pollicares usque pedales vel ultrà, basi suprà sulco lato brevi exarati, dehinc cylindracei, longitudinaliter striati, apice ubi nervi foliorum basales initium ducunt paululùm refracti; juniores rufo-pubescentes. Stipulæ haud in speciminibus obviæ. Flores axillares, pollicem lati. Masculi in racemis paucifloris 3—4-pollicaribus; pedicelli medio articulati, rufo-pubescentes, laterales oppositi, bracteâ foliaceâ lineari-lanceolatâ subtensi. Gemmæ subglobosæ, brevissimè apiculatæ. Calyx 2—3-sepalus; sepala persistentia, concava, coriacea, minutè rufo-pubescentia, subrotunda, acutiuscula, in æstivatione verosimiliter imbricata. Petala 5 v. 6, subcarnosa, glabra, oblongo-ovalia, decidua, crebrè longitudinaliter venosa, apice obtusè et plerumque inæqualiter emarginato-bidentata, minutè ciliata. Squamæ coriaceæ tot quot petala, petalis oppositæ iisque triplò vel quadruplo breviores, subrotundæ, utrinque densè rufo-sericeo-pubescentes. Stamina disco planiusculo villoso inserta, numerosa (20—25), petalis duplò breviora; filamenta crassa, supernè dilatata, in apiculum brevem subulatum antheras medio dorso affigentem desinentia; antheræ parvæ, subovales, versatiles, plerumque resupinatæ, biloculares, loculis longitudinaliter dehiscentibus; pollen minutum, subsphæricum, lævissimum. Pistilli rudimentum nullum. Flores fœminei solitarii; pedunculis tripollicaribus, medio bracteâ unâ alterâve (dùm duæ oppositæ) parvâ, lineari-lanceolatâ instructis, sub flore articulatis. Gemmæ ovatæ. Calyx, corolla squamæque petalis oppositæ ferè uti in masculis. Staminum sterilium filamenta castrata tot quot petala, subulata, acuta, cum squamis hypogynis alternantia. Ovarium ovale, uniloculare; placentis duabus oppositis (an quandoque pluribus?) parietalibus, multiovulatis. Stigma vix dilatatum, sessile, planum, obsoletè 2-, 3-, 4-lobum. Capsula baccata, indehiscens, magnitudine ovi Struthiocameli, ovata, acutiuscula, unilocularis, cortice crassiusculo crustaceo induta, intùs pulpâ tenui parcâ semina ambiente repleta. Semina pollicaria usque bipollicaria (parieti fructûs internæ, teste Reinwardt, quadrifariam inserta), mutuâ pressione variè angulata, crassa. Testa griseo-fusca, durissima, densè lignea, lineam vel ultrà crassa, rugis protuberantibus ramosis undique plùs minùs asperata, hilo læviusculo, lanceolato, pollicem et ultrà longo, lineas 4 ad semipollicem lato, medio longitudinaliter carinato, instructa. Membrana interna testam vestiens, tenuissima, castanea. Albumen seminis cavitatem replens, testâ undique crassius, durum, oleosum. Embryo latissimus, amplitudine ferè albuminis; radicula parva, exserta, cylindrica, hili centrum ferè respiciens; cotyledones subtriangulares, foliacei, tenues, venis numerosis anastomosantibus percursi.

This tree, which is of great importance in the domestic economy of the Malays, and is therefore abundantly cultivated throughout the Malayan Islands, is cursorily mentioned by Valentyn*, but was first accurately described and figured by Rumphius, who, however, states that he never saw the flowers, although aware that they were diœcious. Some desultory notices of it are contained in the fragmentary work of Radermacher†, published at Batavia in 1780; but it was not until more than a century after the death of Rumphius that Professor Reinwardt published its generic characters. Dr. Blume‡ has since proposed the establishment of a family to be named *Pangieæ*, which he states to approach most closely to *Flacourtianeæ*, and to bear also some affinity to *Papayaceæ*; and to this family he refers, besides *Pangium*, the genera *Hydnocarpus* and *Varcca* of Gærtner.

---

* *Amboina*, p. 213. † *Naamlyst der Planten Java.* ‡ In *Tijdschrift voor Natuurlijke Geschiedenis*, i. p. 132.

With no other knowledge of the plants than that afforded by the figures and descriptions of Rheede and Rumphius, Lamarck* long ago pointed out the affinity of *Pangium* to the *Marotti* of Rheede†, which has since been ascertained to be identical with *Hydnocarpus*. On this last-named plant and another nearly related to it (which Roxburgh in his MSS. called *Chaulmoogra*‡—a barbarous name altered by Mr. Brown to *Gynocardia* §), Buchanan Hamilton || established his genus *Chilmoria*, which he states that he had "great difficulty in referring to any of the Natural Orders of Jussieu; sometimes thinking that it had a kind of resemblance to the *Berberides*; at others that it came nearer the third division of the *Tiliaceæ* [*Ternstrœmiaceæ*]; and at others to the third division of the *Aurantia*" [*Flacourtianeæ*]; but, he adds, "I am dissatisfied with all these arrangements." Roxburgh, on the other hand, had no doubt that *Gynocardia* was referrible to *Capparideæ*; and DeCandolle¶ referred *Hydnocarpus* (which, however, he had never seen) to *Flacourtianeæ*. In a verbal communication to M. Zuccarini**, previously noticed, Mr. Brown stated that these two genera formed part of a distinct family, which has since been named *Pangieæ* by Dr. Blume. And lastly Professor Endlicher††, under the head of *Pangiaceæ*, appends *Hydnocarpus* (to which genus he refers both *Pangium* and *Gynocardia*) to *Bixineæ*, including *Flacourtianeæ*.

The three genera, *Pangium*, *Gynocardia* and *Hydnocarpus*, are, however, sufficiently distinct. To the characters above given of *Pangium* I add those of the two others.

GYNOCARDIA, *R. Br. in Roxb. Corom. Pl.*, p. 95, t. 299.—Chaulmoogra, *Roxb. Fl. Ind.* iii. p. 835. —Chilmoria, sp. 1ma, *Hamilt. in Trans. Linn. Soc.* xiii. p. 500.

Flores dioici. *Calyx* 4—5-sepalus. *Petala* 5. *Squamæ* totidem, petalis oppositæ. *Masc. Stamina* indefinita (circa 100); antheræ lineares, basi affixæ, erectæ. *Ovarii* rudimentum nullum. *Fœm. Filamenta* (stamina sterilia) 10—15, erecta, subulata, villosa. *Ovarium* superum, subglobosum, uniloculare; ovulis numerosis, placentis 5 parietalibus affixis. *Styli* 5, breves; *stigmata* dilatata, cordata. *Capsula* baccata, indehiscens, unilocularis, polysperma. *Semina* subovalia, in pulpâ nidulantia; testâ fragili, læviter venosâ. *Albumen* copiosum, oleosum. *Embryo* amplitudine ferè albuminis; radiculâ ovatâ; cotyledonibus planis, crassiusculis.—Arbor *elata*; foliis *sparsis, brevipetiolatis, ovali-lanceolatis, integerrimis, utrinque glabris, nitidis*; floribus *axillaribus, vel e trunco ramisve, pedunculatis, fasciculatis, pallidè flavis, odoris*; fructu *maximo subgloboso*; seminibus *magnitudine* Coryli Avellanæ.

Gynocardia odorata, R. Br. in Roxb. Corom. Pl. l. c.
Chaulmoogra odorata, *Roxb. Fl. Ind. l. c.*
Chilmoria dodecandra, *Hamilt. in Linn. Trans. l. c.*

The specific name of Buchanan Hamilton just cited was founded on an error, which probably also gave rise to his placing this and the following plant in the same genus: not having seen the male tree, he conjectured that the stamina in it were of the same number with the barren filaments in the female flower, instead of eight or ten times as numerous.

HYDNOCARPUS, *Gærtn. Fruct. et Sem. Plant.* i. p. 288, t. 60. f. 3. *Vahl. Symbol.* iii. p. 100.

* *Encyclopédie Méthodique, Botanique*, iv. p. 736.
† *Hort. Malab.*, i. p. 65, t. 36.
‡ See also *Flora Indica*, iii. p. 835.
§ Coromandel Plants, iii. p. 95, t. 299.
|| Linnean Transactions, xiii. p. 500.
¶ *Prodromus*, i. p. 257.
** *Plant. Nov. fasc. 2dus*, p. 60.
†† *Genera Plantarum*, No. 5085.

Wight and Arn. Prodr. i. p. 30. *Wight, Illustr. Ind. Bot.* i. t. 16.—Chilmoria, sp. 2da, *Hamilt. in Trans. Linn. Soc.* xiii. p. 501.—Munnicksia, *Dennst. Schl. Hort. Mal.*

Flores dioici. *Calyx* 5-sepalus, sepalis concavis. *Corolla* 5-petala. *Squamæ* totidem, sericeo-villosæ, petalis oppositæ iisque dimidio breviores. *Masc. Stamina* 5, sepalis opposita; filamenta subulata; antheræ subreniformes, basi affixæ, loculis connectivo lato distinctis. *Ovarii* rudimentum nullum. *Fœm. Stamina* maris, sed antheris epolliniferis. *Ovarium* superum, subglobosum, uniloculare; ovulis numerosis placentis parietalibus 3—6 affixis. *Stigma* sessile, peltatum, planum, 3—6-partitum; laciniis ovario adpressis, cuneatis, bifidis. *Capsula* baccata, indehiscens, unilocularis, polysperma. *Semina* variè angulata, in pulpâ nidulantia; testâ crustaceâ crassâ. *Albumen* copiosum, oleosum. *Embryo* amplitudine ferè albuminis; radiculâ subclavatâ; cotyledonibus foliaceis, venosis.—Arbor; foliis *stipulatis, sparsis, brevi-petiolatis, ovali-lanceolatis, serratis, utrinque glabris*; floribus *axillaribus, in racemis paucifloris*; fructu *magno, subgloboso*; seminibus *majusculis.*

I am much inclined to believe that the *Marotti* of Rheede and the Ceylonese plant described by Gærtner, Vahl, and Messrs. Wight and Arnott, are distinct species; but the specimens which I have examined are too imperfect for positive determination. The latter, in the specimens which I have seen, is altogether destitute of the rufous villosity which covers the younger branches of the former; its leaves are much longer in proportion to their width; they are also more gradually attenuated at the base and acuminated at the apex, crenate instead of serrate, less strongly veined and supported on longer petioles, which have a glandular thickening near the base of the leaf. The fruit of the Ceylonese plant figured by Gærtner differs also considerably in size and form from the Malabar fruit figured by Rheede; but Kœnig, in his manuscripts in the Banksian collection, describes the former as varying from the size of a large cherry to that of an ordinary lemon, and Dr. Wight figures a fruit which may be regarded as intermediate between the two. Rheede describes the Malabar tree as "procera," Kœnig that of Ceylon as "mediocris."

From the characters above given, the numerous points of intimate relationship between these three genera, as well as their distinctive characters, may readily be deduced. The marks of agreement, and consequently their family character, may be thus stated:

PANGIEÆ, *Blume.*

Flores dioici. *Sepala* 5, rariùs 2, 3 vel 4. *Petala* 5, rariùs 6. *Squamæ* totidem, petalis oppositæ. *Masc. Stamina* 5, vel indefinitè numerosa. *Ovarii* rudimentum nullum. *Fœm. Stamina sterilia* tot quot petala, vel rariùs plura. *Ovarium* superum, uniloculare; ovulis numerosis, placentis parietalibus 2—6 affixis. *Capsula* baccata, indehiscens, unilocularis. *Semina* numerosa, magna. *Albumen* copiosum, oleosum. *Embryo* amplitudine ferè albuminis; radiculâ exsertâ; cotyledonibus plerumque foliaceis, venosis.—Arbores; foliis *sparsis, petiolatis, integris, vel rariùs sublobatis*; floribus *axillaribus, solitariis vel fasciculatis vel in racemis paucifloris*; seminibus *magnis*; albuminis oleo *venenato.*

The following are their distinctive characte[rs].

PANGIUM, *Reinw.*

Sepala 2 vel 3. *Petala* 5 vel 6. *Masc. Stamina* numerosa (20—25); antheræ ovales, medio dorso affixæ. *Fœm. Stamina sterilia* tot quot petala, subulata, acuta. *Stigma* obsoletè

2—4-lobum. *Semina* hilo maximo; testâ rugis crassis asperatâ. *Cotyledones* foliaceæ, multinerviæ. —Folia *cordato-ovata vel subrotunda, quandoque triloba, integerrima*; petiolis *longis apice refractis*; floribus *axillaribus*, masculis *in racemis paucifloris*, fœmineis *solitariis longè pedunculatis.*

GYNOCARDIA, *R. Br.*

Sepala 4 v. 5. *Petala* 5. *Masc. Stamina* indefinita (circa 100); antheræ lineares, basi affixæ. *Fœm. Stamina sterilia* 10—15, subulata, villosa. *Styli* 5 breves; *stigmata* dilatata, cordata. *Semina* læviter venosa. *Cotyledones* crassiusculæ, carnosæ.—Folia *brevi-petiolata, ovali-lanceolata, integerrima*; floribus *axillaribus, vel e trunco ramisve, pedunculatis, fasciculatis, odoris.*

HYDNOCARPUS, *Gærtn.*

Sepala 5. *Petala* 5. *Masc. Stamina* 5, sepalis opposita; antheræ subreniformes, connectivo lato basi affixæ. *Fœm. Stamina* maris sed antheris epolliniferis. *Stigma* 3—6-partitum, laciniis dilatatis bifidis. *Semina* subrugosa. *Cotyledones* foliaceæ, venosæ.—Folia *stipulata, brevi-petiolata, ovali-lanceolata, serrata*; floribus *axillaribus in racemis paucifloris.*

The genus *Vareca* of Gærtner*, which Dr. Blume refers along with *Hydnocarpus* to *Pangieæ*, has never been satisfactorily determined. Professor Endlicher† appends it as a "genus dubium" to "*Passifloreæ veræ*;" but Roxburgh‡ is probably right in identifying it with *Casearia*, although I cannot agree with him in referring Gærtner's figure to his *Casearia Vareca*, of which I have examined specimens in fruit from himself. His own genus *Vareca* § (for which he somewhat inconsistently quotes Gærtner also) is referred by Dr. Steudel|| to *Hydnocarpus*, and by Prof. Endlicher with a mark of doubt to *Pentaloba*, Lour.; but there can be no doubt that the three species of which it is made up are generically distinct from each other as well as from the *Vareca* of Gærtner. Of the first (*Vareca Moluccana*) I have examined a specimen from Roxburgh himself, and am unable to refer it to any known genus, or in the absence of fruit to determine its family. I presume that it was gathered in the Calcutta Botanic Garden, and the circumstance of the anthers being destitute of every vestige of pollen will readily account for what seems to have puzzled Roxburgh (who describes it as hermaphrodite), viz. the fourteen years' sterility of the tree, notwithstanding its bisannual flowering. Its characters are as follows:

Flores unisexuales, fortè polygami. *Fœm. Calyx* brevis 5-fidus. *Petala* 5, hypogyna, oblongo-linearia, in æstivatione basi involuto-valvata, apice imbricata; apicibus in anthesi revolutis. *Stamina sterilia* 5, hypogyna, petalis alterna et dimidio breviora; filamentis subulatis; antheris sagittatis, basi affixis, omninò cassis. *Ovarium* ovato-oblongum, apice attenuatum, uniloculare; ovulis numerosis, placentis parietalibus tribus affixis. *Stigma* parùm dilatatum, obsoletè trilobum.—Arbor *Moluccana*; foliis *sparsis, exstipulatis, brevi-petiolatis, obovato-lanceolatis, undulatis, acutis, basi apiceque attenuatis, glabris*; cymis *axillaribus paucifloris*; floribus *majusculis, teste Roxburghio inodoris albis.*

The second of Roxburgh's species (*Vareca lanceolata*) is a true *Pentaloba*, to which genus it has been referred

* *Fruct. et Sem. Plant.* i. p. 290, t. 60. f. 6.
† *Genera Plantarum*, No. 5102.
‡ *Flora Indica*, ii. p. 418.
§ Ibid., i. p. 647.
|| *Nomenclator Botanicus*, ed. 2.

by Mr. Brown*; and the third (*Vareca heteroclita*), also referred by Dr. Wallich† to *Pentaloba*, forms a new and very distinct genus in the same remarkable tribe of *Violariæ*.

Rumphius describes the wood of *Pangium* as hard, solid and weighty. It is found, he states, most abundantly in Celebes, Java, Baley, Boeton, Boero and Ceram, but rarely in Amboyna. Its kernels are used as an ordinary condiment by the natives of most of these islands, being first boiled, then cut into small fragments, and finally macerated in cold water for four-and-twenty hours to divest them of their noxious properties, which are said to render those who eat of them in the raw state giddy, and as it were intoxicated. The kernels thus prepared are dried and laid by to flavour their food in the rainy season. An oil is also expressed from them for burning and frying cakes and fishes. The bark bruised and thrown into water poisons fishes, and the juice of the leaves is used for destroying vermin and in cutaneous diseases. Cows that have eaten of the leaves are said to have died; and the leaves of the male tree are described as being more poisonous than those of the female.

" The tree called *Pangi* by the Malays in the Moluccas and far eastern islands is in Javanese," Dr. Horsfield states, " called *Puchung*, and its fruit *Kluwak*. It grows in all parts of Java in a rich soil near the ocean, chiefly in villages and in their immediate neighbourhood. It is rarely used in Java as an article of diet: the seeds require a previous preparation, aud curry made with their admixture operates as a cathartic on persons not accustomed to their use." I. J. B.

Tab. XLIII. *Fig.* 1. A branch of a female tree of *Pangium edule*, of the natural size. *Fig.* 2. A male raceme. *Fig.* 3. A male flower. *Fig.* 4. Two of the stamina, slightly magnified. *Fig.* 5. One of the scales placed at the base of the petals internally. *Fig.* 6. A female flower, of the natural size. *Fig.* 7. Another flower with the petals and scales removed. *Fig.* 8. A transverse section of the ovarium, slightly magnified. *Fig.* 9. The same, torn open longitudinally. *Fig.* 10. A seed, of the natural size. *Fig.* 11. The hilum. *Fig.* 12. The embryo, *in situ*, after removing half of the albumen and of the coats of the seed.

* In Dr. Wallich's List, No. 4023, confr. No. 7189.

† *l. c.* No. 7189.



SONERILA TENUIFOLIA.

SONERILA TENUIFOLIA, *Bl.*

TAB. XLIV.

SONERILA, *Roxb. Fl. Ind. ed. Wall.* i. p. 180.—Cassebeeria, *Dennst. Schl. Hort. Malab.*

CHAR. GEN. *Calycis tubus* turbinato-trigonus, ad medium usque adhærens; margine libero 3-dentato, circumscissè deciduo. *Petala* 3, summo calycis margini inserta. *Stamina* 3, dentibus calycinis opposita; *antheræ* conformes, lanceolatæ, basi sagittatâ affixæ, poris 2 apicalibus dehiscentes; *connectivum* æquale. *Ovarium* semi-adnatum, 3-loculare, loculis dentibus calycinis oppositis, squamis tribus carnosis subrotundis petalis oppositis basi cohærentibus coronatum. *Stylus* filiformis, stigmate obtuso. *Capsula* in fundo tubi calycis persistentis, squamis epigynis ampliatis incrassatis coriaceis vestiti, immersa; apice intra calycem loculicido-trivalvis. *Semina* numerosa, recta.

Herbæ *vel* suffruticuli; foliis *oppositis, plerumque plùs minùs inæqualibus, basi 3—7-nerviis vel quandoque indefinitè penni-nerviis, membranaceis*; racemis *axillaribus terminalibusve unilateralibus*; floribus *majusculis, pulchrè roseis vel cæruleis, rarissimè tetrameris.*

SONERILA *tenuifolia*, glanduloso-pilosa, caule suffruticuloso parùm ramoso infernè aspero nudo, foliis ovato-lanceolatis acuminatis basi rotundatis trinerviis profundè serratis: altero triplò majore, pedunculis axillaribus terminalibus 2—3-floris, calyce fructifero subæquilateri-trigono glaberrimo.

Sonerila tenuifolia, *Bl. in Florâ*, 1831, p. 491.

DESCR.—Suffruticulus basi decumbens, semipedalis vel dodrantalis, simplex vel propè basin simpliciter ramosus, pilis raris, infernè rigidis subaculeatis, supernè laxis glanduloso-capitatis, vestitus.

Radix fibrosa, radiculas numerosas fibrillosas demittens. Caulis basi flexuosus, nudus, crassitie pennæ corvinæ, angulato-striatus. Folia opposita, membranacea, trinervia, nervis lateralibus tenuibus; altero cujuscunque paris triplò majore, ovato-lanceolato, acuminato, basi subcordato, acutè serrato, serraturis piliferis, suprà pilis raris laxis glanduloso-capitatis instructo, infrà glabro, pollices circiter 2 longo, lineas 8 vel 9 lato; altero minore simillimo, nisi in circumscriptione subrotundo-ovatâ, acutâ. Petioli glabrati, foliis subæquilongi, basi paululùm dilatati. Pedunculi axillares vel terminales, pollicares, plerumque biflori, pilis raris glanduloso-capitatis villosi; pedicelli semipollicares, ut et calyx, similiter glandulosi. Calyx usque ad medium cum ovario accretus; margine libero, 3- vel rarissimè 4-dentato; dentibus patentibus lanceolato-subulatis. Gemmæ lanceolato-conicæ. Petala 3, rarissimè 4, summo margini calycis latâ basi inserta, ejusque dentibus alterna, in æstivatione convoluta, ovato-elliptica, apiculata, venosa, tenera. Stamina 3, rarissimè 4, calycis margini inserta, ejusque dentibus opposita; filamentis in æstivatione inflexis; antheris ejusdem ferè longitudine, in æstivatione resupinatis, apicibus inter tubum calycis liberum squamasque epigynas nidulantibus, basi sagittatâ affixis, lineari-lanceolatis, bilocularibus; loculis connectivo æquali (nec producto nec incrassato) connexis, apice poris duobus parvis subrotundis dehiscentibus. Pollen minutum, latè ellipticum, læviusculum. Ovarium calyci semi-accretum, supernè glabrum, 3-, vel rarissimè 4-loculare; loculis dentibus calycinis oppositis; ovulis numerosis, placentæ carnosæ ex angulo loculi interno ortum ducente affixis, anatropis. Squamæ epigynæ 3, vel rarissimè 4, petalis oppositæ, summo ovario insertæ, subrotundæ, obtusissimæ, glabræ, carnosæ, basi invicem cohærentes. Stylus simplex, filiformis, longitudine staminum, glaber, stigmate dilatato capitatus. Calycis margo extremus cum dentibus, fructu maturescente, circumscissè deciduus. Capsula triangularis, fundo calycis immersa, 3-locularis, apice loculicido-3-valvis, squamis epigynis incrassatis, ampliatis, coriaceis, calycis tubum integerrimum persistentem intùs vestientibus, coronata. Semina numerosa, minuta, placentæ obconicæ ex angulo loculi interno porrectæ undique affixa, dimidiato-obovata, recta. Testa castanea, minutè punctato-rugulosa, strophiolâ unilaterali fungosâ raphen tegente instructa; membrana interna tenuissima; chalaza parva apicalis. Albumen nullum. Embryo oblongo-ellipticus; radicula hilo proxima, obtusa; cotyledones breves, crassæ.

This very pretty, and in some respects singular, genus was established by Roxburgh* on a plant figured by Rheede†, to which he added three other species and Dr. Wallich a fourth. In the same year that Roxburgh's descriptions were published, namely in 1820, Jack‡ described a sixth species from Penang, and two years afterwards§ a seventh from Sumatra. Dr. Wallich enumerated all these species in his "List"‖, with the exception of that found in Sumatra by Jack, and added six others, making in all thirteen. Of these he figured two, in the same year (1831), in his "Plantæ Asiaticæ Rariores¶." In the same year also Dr. Blume** characterized three Javanese species as new, one of which is that now figured and described. Drs. Wight and Arnott††, in 1834, suggested the obliteration of two of Dr. Wallich's species, and added two new ones from Southern India and

* *Flora Indica*, Ed. Wall. 1, p. 180.

† *Hort. Malab.* ix. p. 127, t. 65.

‡ In Malayan Miscellanies, vol. i. No. 2, p. 7.

§ Ibid., vol. ii. No. 7, p. 16.

‖ No. 4089–4099.

¶ Vol. ii. pp. 1 and 2, t. 102.

** In *Flora*, p. 490-1.

†† *Prodr. Fl. Penins. Ind. Orient.* i. p. 321–2.

Ceylon; and Dr. Arnott* has since characterized six additional species from the latter country, referring at the same time to some unpublished Peninsular species in his possession. In the first volume of his "Illustrations of Indian Botany†," published in 1840, Dr. Wight figures one of the plants described by himself and Dr. Arnott; and observes that he has found but few new species, but has seen great reason to believe that the plants of this genus are subject to so much variation as to throw doubts on the distinctness of some of those already described. And lastly, Dr. Royle, in his "Illustrations of the Botany, &c. of the Himalayan Mountains‡," has figured one of the new species mentioned in Dr. Wallich's "List" as found in Tavoy, and which he had himself collected in the Deyra Doon. Supposing all the species described or indicated to be really distinct, their number would amount to twenty-four; but I am inclined to believe that these must be reduced to twenty-one, thirteen of which I have had opportunities of examining, while seven of the remainder (being all the Ceylonese species described by Drs. Wight and Arnott) are known to me only by their descriptions, and the eighth (from Southern India) by Dr. Wight's figure in addition.

The natural relations of the genus were at first strangely misunderstood. Roxburgh, while describing the ovarium to be "exactly as in *Osbeckia Chinensis*," states (perhaps by a typographical error) that "in its natural character *Sonerila* agrees very exactly with *Burmannia*;" and Sprengel§ has consequently referred it to *Burmanniea*. In 1825 Don‖ described it as "Ericeis affine," stated that it was monopetalous, and added "genus videtur sui ordinis;" but the error arose from his having mixed up with it a species of *Argostemma*. Prof. Reichenbach¶ placed it successively beside *Burmannia*, *Sarcopyramis* and *Azalea*, and finally adhered to the last position. Dr. Bartling** also referred it to *Ericeæ*. In Dr. Wallich's "List" it follows *Sarcopyramis* among *Melastomaceæ*, and in his "Plantæ Asiaticæ Rariores" it is spoken of as a Melastomaceous genus. The slightest examination of any of the species is sufficient to prove the correctness of this classification, which has been since universally adopted; and the only remaining point for consideration is its precise situation in the family. Dr. Blume, in 1831, referred it, on account of its adherent calyx, to DeCandolle's tribe of *Miconieæ*, and regarded it as connecting that tribe more closely with *Lavoisiereæ* by means of *Salpinga* in the latter, which he stated it to resemble in habit and the structure of its calyx. In 1836 Professor Lindley†† placed it and *Sarcopyramis* in a distinct tribe, which he named *Sonerileæ*, along with *Cyathanthera*, Pohl., and *Noterophila*, Mart.; but both these last-named genera are widely different from *Sonerila*. Prof. Endlicher‡‡ arranged it, after *Salpinga*, Mart., *Bertolonia*, Raddi, and *Lithobium*, Bong., at the end of *Lavoisiereæ*, placing *Sarcopyramis*§§, Wall., in *Miconieæ*. And lastly, Mr. Bentham‖‖ has referred to it as forming, along with *Sarcopyramis*, *Salpinga*, *Bertolonia*, and perhaps *Lithobium*, a very natural group in the tribe *Lavoisiereæ*, which he circumscribes somewhat differently from DeCandolle. "They are all," he says, "low herbs [or small shrubs], with obconical or turbinate calyces, triangular [or quadrangular] capsules usually truncate, and a peculiar inflorescence, which renders it easy to distinguish them." It is to be observed, however, that the American genera *Salpinga* and *Bertolonia*, (*Lithobium* I have had no opportunity to examine) differ from the Asiatic in several very important points. Their capsule, which in the early stage adheres very slightly to the tube of the calyx, is in the ripe state entirely free; and the cells of their ovaria are fewer in number than the divisions of their calyx, and consequently bear no direct relation to them. In *Sonerila* and *Sarcopyramis*, on the contrary, the lower part of the capsule remains permanently adherent to the base of the tube of the calyx; and the cells of the ovarium are equal in number to the calyx-teeth, to which they are regularly opposed.

* In Companion to the Botanical Magazine, ii. p. 307.

† p. 218, t. 94.

‡ p. 215, t. xlv. f. 2.

§ *Systema Vegetabilium*, i. p. 125.

‖ *Prodr. Fl. Nepal.*, p. 154.

¶ *Conspectus.*

** *Ordines Naturales Plantarum*, p. 156.

†† Natural System of Botany, p. 42.

‡‡ *Genera Plantarum*, No. 6192.

§§ *Ibid.* No. 6262.

‖‖ In Journal of Botany, ii. p. 297.

This opposition of the cells of the ovarium to the divisions of the calyx, instead of those of the corolla, affords another instance of the deviation from the ordinary relation of parts in Dicotyledonous plants, to which reference has been made in a previous article*. In this case, too, as in *Munronia* and its allies, the variation appears to be only of generic value; for although it is found in some other Melastomaceous genera with isomerous ovaria, the ordinary relation is also of frequent occurrence in the family, and the difference bears no relation to what appear to be its natural divisions. But combined with this structure there also occurs in *Sonerila* and *Sarcopyramis* a curious modification of the apex of the ovarium, which is surmounted by fleshy scales, opposite to the petals and equal to them in number, between which and the free limbus of the calyx-tube the anthers are lodged in their early and deflected stage. The scales, which are at first of small size, become (as the capsule ripens) gradually enlarged, thickened and of a coriaceous texture, and in *Sonerila* are closely applied to the inner surface of the persistent portion of the limb of the calyx, while in *Sarcopyramis* they project considerably beyond its margin. Their lateral edges correspond with the principal lines of dehiscence of the vertex of the capsule, and they consequently appear to surmount and form a portion of its radiating valves, in the centre of which and corresponding with the dissepiments a second line of dehiscence is also sometimes apparent.

From these peculiarities in structure it is obvious that *Sonerila* has no immediate affinity with any other genus of the family except *Sarcopyramis*, from which it is readily distinguishable by the ternary number of all its parts; the circumscissile falling off of the extreme limb of its calyx; the form of its anthers; that of its epigynous scales; and the deep immersion of its capsule. In habit and in most other essential points, the two genera exhibit a close agreement, as will be seen from the following character of

SARCOPYRAMIS, *Wall. Tent. Fl. Nepal.*, p. 32, t. 23.

Calycis tubus inversè pyramidalis, ad medium usque adhærens; margine libero truncato, 4-dentato, persistente. *Petala* 4, summo calycis margini inserta. *Stamina* 8; *antheræ* conformes, subovales, basi affixæ, poris 2 apicalibus dehiscentes; *connectivum* æquale. *Ovarium* semi-adnatum, 4-loculare; loculis dentibus calycinis oppositis; ovulis numerosis. *Squamæ* epigynæ 4, carnosæ, subtrilobæ, petalis oppositæ, basi cohærentes. *Stylus* filiformis, stigmate dilatato. *Capsula* squamis epigynis ampliatis coriaceis exsertis coronata, 4-locularis, apice loculicido-4-valvis. *Semina* numerosa, recta.—Herbæ *subsimplices*; foliis *oppositis, inæqualibus, membranaceis, serrulatis, 3-nerviis*; floribus *in fasciculis terminalibus paucifloris, lætè roseis.*

Of this genus Dr. Wallich has two species:—

Sarc. Napalensis, foliis ovatis.
S. Napalensis, *Wall. ! l. c. & in "List," No.* 4088.
Hab. in Napaliâ (*exam. sicc. in Herb. Ind. Soc. Linn. et in Herb. Banks.*).

Sarc. lanceolata, foliis angustè lanceolatis.
S. lanceolata, *Wall. ! List, No.* 6290.
Hab. in Sylhet (*exam. sicc. in Herb. Ind. Soc. Linn.*).

In Dr. Blume's† Memoir on East Indian *Melastomaceæ* the genus *Sonerila* is divided into two sections, with the following characters:—1. "SONERILÆ; *Calyx* hirsutus, haud angulatus. *Petala* ovata, acuta, basi lata. *Capsula* turbinata, valvulis tribus bipartitis dehiscens. *Folia* opposita, altero subabortivo, basi dimidiato-cordata.

* See p. 185.

† *Flora*, 1831, p. 490.

2. Trigonocapsæ; *Calyx* glaber, trigonus. *Petala* ovato-lanceolata, utrinsecùs acutiuscula. *Capsula* turbinata, basi attenuata, trigona, valvulis tribus indivisis dehiscens. *Folia* opposita, subæqualia, basi vix obliqua." To the first of these sections Dr. Blume refers his *S. begoniæfolia* (which I believe to be identical with *S. Moluccana*, Roxb.) and *S. pauciflora* (which I cannot hesitate to refer to *S. heterophylla*, Jack); and to the second *S. erecta*, Jack, and *S. tenuifolia*, Bl. But each of these four species has a very distinct habit, and the other characters relied on for the distinction of the sections fail on a wider application. The calyx is always more or less angular, and its degree of hairiness (or in the fructiferous state murication) does not coincide with any other important character; the difference in the shape of the petals is very slight; the abbreviated or lengthened form of the capsule (or rather of the fructiferous calyx-tube) affords an excellent specific, but scarcely a sectional, character; and its valves are almost always slightly bifid. I subjoin the characters of the thirteen species with which I am acquainted, together with those of *S. Brunonis* figured by Dr. Wight.

1. *Sonerila Moluccana*, rufo-hirsuta, caule brevi, foliis dimidiato-ovatis acuminatis inæqualiter cordatis heteroneuris*: altero 20-plò majore, calyce fructifero subæquilateri-trigono† muricato.

S. Moluccana, *Roxb. Fl. Ind. ed. Wall.* i. p. 182.—*Jack! in Mal. Misc.*, vol. i. No. 2. p. 8.—*Wall.! List*, No. 4089.

S. begoniæfolia, *Bl. in Florâ*, 1831, p. 490.

Hab. in Insulis Moluccanis, *Roxb.*; in Insulâ Penang, *Jack*, *Wall.* (*exam. sicc. in Herbb. Banks. et Ind. Soc. Linn.*)

2. *S. maculata*, hirsutiuscula, caule brevi, foliis dimidiato-ovatis obliquè cordatis heteroneuris: altero triplò majore, racemo 6—10-floro, calyce fructifero oblongo-prismatico glabro.

α. *maculata*, foliis suprà e pilorum basibus inflatis eleganter albo-punctatis.

Soneri-ila, *Rheede, Hort. Malab.* ix. p. 127, t. 65. ?

S. maculata, *Roxb.! Fl. Ind. ed. Wall.* i. p. 180.

β. *emaculata*, punctis albis obsoletis.

S. emaculata, *Roxb.! l. c.*, p. 181.

S. maculata, *Wall.! List*, No. 4091.—*Wight & Arn. Prodr. Fl. Penins. Ind. Orient.*, p. 321 (pars).

Hab. in Sylhet, *Roxb.*; Napaliâ, *Wall.* (*exam. sicc. in Herbb. Banks. et Ind. Soc. Linn.*)

3. *S. Wallichii*, glabriuscula, foliis subradicalibus ovatis acutis subobliquè cordatis heteroneuris:

* I have used the term "*heteroneuris*" to avoid the repetition of a long and circuitous description of the neuration of several of the species. In half a dozen species, that is to say in *S. tenera*, *grandiflora*, *Brunonis*, *tenuifolia*, *heterophylla* and *erecta*, the lateral nerves take their origin (as in the family generally) at or immediately above the base of the leaf; in *S. Rottleri* they are truly penninervious, arising at nearly equal distances from the whole length of the midrib of the leaf; in two others, *S. squarrosa* and *arguta*, they are similarly equidistant at their origin, but reduced to inconspicuous veins; while in four of the species, viz. *S. Moluccana*, *maculata*, *Wallichii* and *angustifolia*, they partake of both characters, three, five or seven of the lateral veins originating at or immediately above the base, and two or three others being superadded towards the middle of the leaf. It is to this last modification that I have applied, for the sake of brevity, the term "*heteroneuris*."

† This is another term adopted with a similar view. The fructiferous calyx of the several species, always more or less trigonous, differs greatly in its proportional length. In the above characters, "*subæquilateri-trigonus*" is meant to signify that its length is about equal to one side of its truncated extremity; "*turbinato-trigonus*" that with a similar general outline, it is somewhat more attenuated at the base; "*oblongo-prismaticus*" that its length is twice as great, and "*lineari-prismaticus*" three times as great, as its breadth.

altero multò majore, scapo 4—6-floro, calyce fructifero (immaturo sed verosimiliter) subæquilateri-trigono glabro.

S. Rheedii, *Wall.! List*, No. 4096.—*Wight & Arn. l. c.* p. 321 (pars).

Hab. in Indiâ Orientali, *Wall. ex Herb. Heyne* (*exam. sicc. in Herb. Ind. Soc. Linn.*).

Obs. Nomen mutavi ob synonymon Rheedii potiùs ad præcedentem (annuente Roxburghio) pertinens. Specimina Wallichii manca, et characteres fortè in posterum emendandæ.

4. *S. Rottleri*, glabriuscula eaulescens, foliis ovatis basi rotundatis penninerviis: altero 12-plo majore, racemis 4—6-floris, calyce fructifero (immaturo sed verosimiliter) subæquilateri-trigono glabro.

S. Rottleri, *Wall.! List*, No. 4097.

S. maculata, *Wight & Arn.*, *l. c.* p. 321 (pars).

Hab. ad Courtallum, *Wall. ex Herb. Madr.* (*exam. sicc. in Herb. Ind. Soc. Linn.*)

Obs. Foliis basi æqualibus omninò penninerviis, necnon capsulæ formâ, a *S. maculatâ* abundè diversa.

5. *S. angustifolia*, hirsutiuscula caulescens, foliis parùm inæqualibus ovatis basi acutis heteroneuris, racemo 4—8-floro, calyce fructifero oblongo-prismatico glabro.

S. angustifolia, *Roxb.! Fl. Ind. ed. Wall.* i. p. 182.—*Wall. Pl. Asiat. Rar.* ii. p. 1, t. 102. fig. sinistra.

Hab. in Sylhet, *Roxb. Wall.* (*exam. sicc. in Herb. Banks.*)

Obs. Specimina sub hoc nomine (No. 4090) a Clariss. Wallichio distributa et etiam in Herb. Soc. Linn. deposita *Argostemma sarmentosum*, Wall. referunt. Confer anteà, p. 95.

6. *S. secunda*, pilosiuscula caulescens, foliis ovato-lanceolatis basi rotundatis parùm obliquis suprà albo-punctatis: altero triplò majore, racemo 4—12-floro, calyce fructifero oblongo-prismatico glabro.

S. secunda, *Wall.! List*, No. 4094.

Hab. in Tavoy, *Wall.* (*exam. sicc. in Herb. Ind. Soc. Linn.*)

7. *S. tenera*, pilosula caulescens, foliis subæqualibus membranaceis ovato-lanceolatis basi attenuatis trinerviis, racemo 2—6-floro, calyce fructifero oblongo-prismatico glabro.

S. tenera, *R. Br.! in Wall. List*, No. 4098.—*Royle, Illustr. Bot. Himal.*, p. 215, t. 45. f. 2.?

Hab. in Tavoy, *Wall.*; in Deyra Doon, *Royle* (*exam. sicc. in Herbb. Banks. et Ind. Soc. Linn.*).

Obs. Figura Royleana folia exhibet subrotundo-ovata basi apiceque obtusa. Planta aliàs simillima si fortè diversa *S. Roylei* dicenda.

8. *S. grandiflora*, carnosa glaberrima caulescens, foliis subæqualibus ovali-lanceolatis basi attenuatis trinerviis supra medium argutè serratis, racemo 3—4-floro, calyce fructifero turbinato-trigono glabro.

S. grandiflora, *R. Br.! in Wall. List*, No. 4099.—*Wight & Arn. l. c.* p. 322.

Hab. in Montibus Neelgheries, *Noton* (*exam. sicc. in Herb. Ind. Soc. Linn.*).

9. *S. Brunonis*, pilosiuscula caulescens parùm ramosa, foliis subæqualibus ovatis basi rotundatis 5—7-nerviis argutè serratis, racemo 4—6-floro, calyce fructifero oblongo-prismatico glabro.

S. Brunonis, *Wight* & *Arn*, *l. c.* i. p. 321.—*Wight*, *Illustr. Ind. Bot.* i. p. 218, t. 94.
Hab. ad Courtallum, *Wight*.

10. *S. tenuifolia* (vide suprà).

11. *S. heterophylla*, densè setosa suffruticulosa parùm ramosa, foliis oblongo-obovatis acuminatis basi 1-auriculatis 3—5-nerviis ultra medium profundè serratis: altero 20-plò majore, pedunculis axillaribus subsessilibus 2—4-floris, calyce fructifero subæquilateri-trigono muricato.
S. heterophylla, *Jack in Mal. Misc.*, vol. ii., No. 7, p. 16.
S. pauciflora, *Blume in Florâ*, 1831, p. 491.
Hab. in Insulâ Sumatra, *Jack*; Java, *Blume*, *Horsf.* (*exam. sicc. in Herb. Horsf.*)

12. *S. squarrosa*, glabra, caule basi nudo cicatrisato setoso-aculeato, foliis confertis lanceolatis in petiolum brevem attenuatis argutè serrulatis venulosis, pedunculis 1—3-floris, calyce fructifero oblongo-prismatico glabro.
S. squarrosa, *Wall.! in Roxb. Fl. Ind.* i. p. 182, *et in Pl. Asiat. Rar.* ii. p. 2, t. 102. fig. dextra.
Hab. in Sylhet, *Wall.* (*exam. sicc. in Herbb. Banks. et Ind. Soc. Linn.*)
Obs. In hâc specie et sequenti oppositio foliorum minimè evidens: in hâc aculei caulis subulati stipulas quodammodò referunt, foliorum cicatrices magnas utrinque stipantes; fortè tamen in utrâque specie foliorum oppositorum vestigia in setam reducta.

13. *S. arguta*, pilosula, caule brevissimo-aculeato-setoso, foliis membranaceis oblongo-lanceolatis in petiolum longum attenuatis argutè mucronato-serratis venulosis, scapo 1-floro, calyce fructifero oblongo-prismatico glabro.
S. arguta, *R. Br.! in Wall. List*, No. 4095.
Hab. in Montibus Sylhet, *Wall.* (*exam. sicc. in Herbb. Banks. et Ind. Soc. Linn.*)

14. *S. erecta*, suffruticulosa ramosissima, caule bifariàm puberulo, foliis subæqualibus brevipetiolatis elliptico-lanceolatis argutè serratis trinerviis hirtis, pedunculis terminalibus 2—3-floris, calyce fructifero lineari-prismatico glabro.
S. erecta, *Jack. in Mal. Misc.*, vol. i. No. 2, p. 7.—*Blume in Florâ*, 1831, p. 491.—*Wall.! List*, No. 4092.
Hab. in Insulâ Penang, *Jack*, *Wall.* (*exam. sicc. in Herbb. Banks. et Ind. Soc. Linn.*)

From Dr. Horsfield's notes I learn that he found *Sonerila heterophylla* "in 1804 near Pakkalongan, on the north coast of Java, about 100 miles westward of Samarang, on hills about 1000 feet above the level of the Ocean: the native name is *Pattikan*." Dr. Horsfield never noticed it elsewhere, and Dr. Blume gives no particular habitat, but states it to be found in thickets of some elevation in Java: according to him its native name is *Tjodjok Buwu*. Of *S. tenuifolia*, Dr. Horsfield says: "I found it, in 1814, about three or four thousand feet above the level of the Ocean, on the declivities of the Mountain Prahu, situated in the middle of the island, somewhat westward of Pakkalongan. In this locality it is abundant, but I have not collected it in the eastern parts of Java, and I have no native name for it. On referring to my plants of this family from Sumatra, I find a specimen from that island, agreeing apparently with the Java plant: this is also, as far as I recollect, from a considerable elevation. I never noticed either species in the lower regions." Dr. Blume's habitat is "in sylvis primævis Javæ."

I. J. B.

Tab. XLIV. *Fig.* 1. A plant of *Sonerila tenuifolia*, of the natural size. *Fig.* 2. An unexpanded flower. *Fig.* 3. An expanded flower. *Fig.* 4. A vertical section of an unexpanded flower, after the removal of the petals, slightly magnified. *Fig.* 5. An anther, magnified. *Fig.* 6. The calyx, after the falling off of the petals, stamina and style. *Fig.* 7. The capsule, cut open longitudinally, showing the attachment of the seeds, and the enlarged persistent scales surmounting the valves. *Fig.* 8. A seed with the strophiolum turned towards the observer, much magnified. *Fig.* 9. A lateral view of the seed, with its strophiolum. *Fig.* 10. A seed, after the removal of the testa. *Fig.* 11. The embryo.



PTEROCYMBIUM JAVANICUM.

TAB. XLV.

CHAR. GEN. *Flores* polygamo-monoici (ferè hermaphroditi). *Calyx* 5-fidus, patens. *Antheræ* (10) simplici serie; loculis omnibus parallelis. *Ovaria* disperma. *Stigmata* filiformia, recurvata. *Pericarpia*: *Folliculi* foliacei, naviculares, longè ante maturitatem aperientes. *Semen* unicum, albuminosum. *Embryonis Radicula* hilo proxima.

Arbor, foliis *lobatis indivisisve*; paniculis *subterminalibus*.

OBS. Genus *Sterculiacearum* SCAPHIO proximum et forsan nimis affine. *Scaphium* verò differt: *Antheris* (15—20) congestis; *stylis* arctè cohærentibus; *stigmatibus* coalitis, unicum lobato-capitatum efformantibus.

DESCR.—Arbor sylvestris, 50—60-pedalis; trunco modicè crasso, cortice lævi, rufescenti-fusco; comâ patenti (*D. Horsfield*). Folia alterna, 5—3-loba, passim indivisa, circùmscriptione latè ovata, basi cordata 5-nervia, lobis ellipticis brevè acuminatis, sinubus obtusis; dum indivisâ, paulò altiùs cordata, 3—5-nervia, brevissimè acuminata: omnium adulta supèr glabra præter nervos venasque primarias tenuissimè pubescentes, pube simplici: subtèr pube simili magis copiosâ, præsertim in nervis venisque ferè omnibus et insuper, rariore tamen et tenuiore, per totam paginam: novella utrinque pube stellari copiosâ tecta. Petioli teretiusculi, undique pubescentes, anticè sulco tenui exarati, basi apiceque paululùm incrassati, quandoque folia subæquantes, sæpiùs dimidio et ultrà breviores. Stipulæ laterales, subulatæ, caducæ. Panicula subterminalis, e racemis alternis approximatis subcorymbosis. Pedicelli extra medium articulati, ipso articulo constricto, inter dilatationes duas manifestas. Bracteæ omnes deciduæ v. caducæ. Calyx monophyllus, ad medium quinquefidus, æqualis, turbinato-campanulatus, coriaceus, glaber, laciniis tomento minutissimo cinereo marginatis, immersè nervosus venisque anastomosantibus latè semilanceolatis; æstivatione valvatâ, alabastro 5-gono, turbinato; tubo intùs basi corpusculis scobiformibus minutis densissimè tecto. Corolla nulla. Flores hermaphroditi vel polygamo-monoici. Hermaphrodito-*Masculi*: Columna genitalium (gynostemium) e basi parùm dilatatâ cylindracea; dimidio inferiore breviore, pube tenuissimâ simplici patenti; superiore glabro, apice parùm dilatato (staminibus occultato) in urceolum decem- v. octo-dentatum antheriferum. Antheræ 10 v. 8 simplici serie dispositæ, incumbentes,

supra medium affixæ; loculis appositis, contiguis, linearibus, longitudinaliter dehiscentibus. Pollen læve, subovale. Pistilla omnibus punctis ferè ut in Femineis. Hermaphrodito-*Feminei*: Columna quandoque brevissima. Antheræ ut in masculis numero et dispositione, polline forsan effœto. Ovaria 5 (raro 6) ipso apice columnæ insidentia, sessilia, arctè approximata, distincta tamen, dorsi apice gibboso, ita ut stylus quasi lateralis evadit, disperma; ovulis collateralibus erectis anatropis. Styli 5—6 arctè approximati, leviter cohærentes, breves. Stigmata filiformia, recurvata, intus longitudinaliter papulosa. Pericarpia 5—6, aliqua sæpè abortientia, follicularia, singula stipiti filiformi pubescenti insidentia; stipite communi 5-angulato, vix longitudine calycis diù persistentis haud mutati. Folliculi citò post fœcundationem et longè ante seminis maturitatem aperientes, foliacei, reticulato-venosi, naviculares; dimidio inferiore duplò profundiore ibique carinâ in lobulum obtusum productâ, superiore planiusculo. Semen unicum maturescens, exsertum, basin folliculi occupans, erectum, basi insertum, sphæricum, læve, tenuissimè pubescens pube simplici. Integumentum triplex; *extimum* crustaceo-membranaceum, latere interiore, respectu axeos communis folliculorum, lineâ parùm elevatâ ab hilo ad apicem ductâ raphem indicante insignitum, superficie interiore præter raphem venis per alterum latus recurrentibus ad basin tendentibus, ramo crassiore raphi opposito; inter hocce integumentum (v. epidermidem testæ) et medium substantia adest parca subfloccosa: *medium* (endospermium) nucamentaceum, apice extus areolâ circulari (chalazâ) insignitum: *intimum* (integumentum interius) membranaceum. Albumen nucleo conforme, bipartibile, amygdalinum, album. Embryo erectus, ferè longitudine seminis, albus. Cotyledones latitudine albuminis idque bipartientes, foliaceæ: Radicula hilo proxima, brevis, subovata.

Pterocymbium javanicum, according to Dr. Horsfield, grows scattered among other trees in the luxuriant forests which, at a small elevation above the sea, cover many of the plains in the central and eastern districts of Java.

The native name is *Wining* or *Kemoonoong*.

Tab. XLV. *Fig.* 1. A branch bearing leaves. *Fig.* 2. A portion of the panicle, bearing ripe fruits. *Fig.* 3. An unexpanded flower. *Fig.* 4. The same, slightly magnified, opened longitudinally, the sexual organs being at that period sessile and the anthers closed. *Fig.* 5. An anther seen in front. *Fig.* 6. The same, seen from behind. *Fig.* 7. The column thickened at top, which in *Fig.* 8 is seen divided into ten teeth. *Fig.* 9. One of the pistilla, cut longitudinally to show the two erect collateral ovula. *Fig.* 10. The half of an expanded flower, in which the column is elongated. *Fig.* 11. The base of a carpel, with its single seed. *Fig.* 12. The seed, deprived of its outer integument. *Fig.* 13. The same, after the removal of the inner integument. *Fig.* 14 and 15. The embryo, with its bipartite albumen.

Sterculiaceæ, to which *Pterocymbium* evidently belongs, was first proposed as a distinct natural family by Ventenat in 1804*; his only character separating it from *Malvaceæ* being the presence of albumen surrounding the embryo, and from *Tiliaceæ* its monadelphous stamina.

In 1814†, in suggesting the formation of Natural Classes of plants and proposing *Malvaceæ* as one of these classes, I referred *Sterculiaceæ* to it, but regarded the order as more limited than Ventenat appears to have done; considering it as sufficiently distinct from *Buttneriaceæ*, to great part of which, however, Ventenat's two principal characters of *Sterculiaceæ* equally belong.

---

* *Hort. Malmais.* fol. 91.

† Appendix to Capt. Flinders's Voyage to Terra Australis, vol. ii. p. 540.

In endeavouring to establish the characters and affinities of *Pterocymbium*, it became necessary to examine those of the established genera most nearly related to it, and as this examination has led me to adopt considerable alterations in arrangement, and enabled me to make some additions to the number of species, I shall here give the characters of the genera and species of that tribe to which the name of *Sterculieæ* has been applied by DeCandolle and Endlicher, prefacing that account with a history of the tribe, and especially of the genus *Sterculia*, from its formation to the present time.

In the botanical history of *Sterculia*, it is not necessary to go farther back than 1747, when Linnæus first published his character of the genus*, founded on the specimens and unpublished figures of Hermannus, whose Ceylon herbarium, of which the Museum Zeylanicum is a catalogue, had been sent from Copenhagen for his inspection. The result of a careful examination of this herbarium was the publication in 1748 of the "Flora Zeylanica."

Hermann's herbarium (purchased by Sir Joseph Banks and now in the British Museum) contained flowering specimens of *Sterculia fœtida* and *Balanghas*, and the fruits of both species were figured by Hermann himself in the volume of drawings which accompanied the herbarium. From these materials, confirmed no doubt by the figures of the fruits in "Hortus Malabaricus" and "Herbarium Amboinense," the Linnean genus was entirely established. The character given, however, is strictly applicable to *Sterculia fœtida* only; and Linnæus was probably induced to refer *Balanghas* to the same genus, either from not having distinctly seen the remarkable form of the flower in that species, or, which is more likely, disregarding that difference was determined by the exact resemblance in its fruit to that of *S. fœtida*, both being figured in the volume of drawings already referred to. These were the only materials he appears ever to have examined, and his own herbarium contained absolutely nothing except a single leaf of *S. fœtida*: the generic character consequently remains unchanged in all his subsequent works.

In "Flora Zeylanica," Linnæus correctly includes *Sterculia* in his Class *Monœcia*, notices the imperfect stamina in the female flower, and only overlooks the minute rudiments of ovaria in the male flower. He referred the genus to his Natural Order *Tricoccæ* (very nearly corresponding with the *Euphorbiaceæ* of Jussieu), as appears first in "Philosophia Botanica," published in 1751, and afterwards in the sixth edition of his "Genera Plantarum" in 1764. In this determination of its affinity he was followed by Bernard de Jussieu in 1759, by Adanson in 1763; and in a manuscript list of the arrangement of plants adopted in 1779 in the Paris Garden, I find *Sterculia* still placed in the same family. The generic character of *Sterculia*, as given by Linnæus, who does not notice, and had no opportunity of ascertaining the structure of the seed, might with very slight alteration stand for that of the whole tribe, *Heritiera* alone excepted.

In the order of time, the next work in which the same genus is described, though under a different name, is Aublet's History of the Plants of French Guiana†, which appeared in 1775. He describes his genus *Ivira*, which all subsequent botanists have referred to *Sterculia*, as having hermaphrodite flowers, with ten stamina, and the capsules or follicles surrounded at the base with rigid filiform processes, formed as he states by the enlargement of the hairs which according to him exist in the flowering state. But from an examination of the specimens in his own herbarium (purchased by Sir Joseph Banks and now in the British Museum), as well as from others collected in the same country by the late celebrated Professor Richard, it appears that the flowers are unisexual; that the hairs of the urceolus antherarum which Aublet describes, and which, as he states, by their enlargement form the mass of rigid processes surrounding the ripe fruit, have no existence; and that this singular appendage to the fruit is an accidental structure or monstrosity, probably of rare occurrence, of which I have found a single specimen among the loose fruits of his herbarium.

In 1775 also was published the "Flora Ægyptiaco-Arabica" of Forskael, who describes a supposed new genus, *Culhamia*‡, which is no doubt a species of *Sterculia*, certainly, however, not *platanifolia* as Vahl affirms, but

* *Nova Genera Plantarum, respondente Dassow*, p. 13. † p. 695, t. 279. ‡ p. 96.

perhaps either *S. tomentosa* of the "Flora Senegambiæ," or the nearly related species *abyssinica*. *Culhamia* is described as having hermaphrodite flowers, and it is stated that the style, which is originally concealed by the stamina, only becomes visible after the expansion of the flower, so that here we have the same account of structure and gradual development of pistillum which was afterwards given by Cavanilles and adopted by de Jussieu.

In 1786, in the first volume of the Acta Acad. Patavin.*, Marsili proposed a new genus related to *Sterculia*, and formed of *St. platanifolia* of the "Supplementum Plantarum" of the younger Linnæus.

In 1788 Cavanilles published his fifth dissertation on Monadelphous plants, in which *Sterculia*† appears with its characters considerably modified, *Ivira* of Aublet being included in it, and some additional species described. He refers the genus to *Monadelphia*, states the flowers to be hermaphrodite, and accounts for their unisexual appearance by assuming the gradual and more tardy development of the female organ; he also describes the stigma as either bifid or with five rays, the supposed existence of the bifid stigma being founded on an error in the drawing of *S. platanifolia* by Mlle. Bassport, from which his engraving is copied.

In 1789 the immortal work of A. L. de Jussieu appeared. *Sterculia* is there‡ for the first time correctly referred to the Natural Order *Malvaceæ* as then understood: the generic characters, however, are stated to be taken from Aublet and Cavanilles. The erroneous assertion of the latter that the flowers are hermaphrodite, and his account of the gradual development of pistillum are adopted, and finally Jussieu expresses a doubt whether the embryo is corrugated, which he describes it to be in all the other genera of the same section of *Malvaceæ*, and which he considers as one of the principal characters of that Natural Order.

In Schreber's edition of the "Genera Plantarum §" of Linnæus, published the same year, *Sterculia* is referred to *Dodecandria*, and the few changes made in the character are apparently taken from Cavanilles, and among these is the *stigma bifidum*.

In 1789 also Dryander, in the first edition of "Hortus Kewensis," established, partly from the manuscripts of J. G. Kœnig, the genus *Heritiera*‖, which he justly places next to *Sterculia*, and refers both to *Monœcia Monadelphia*.

Neither in Willdenow's edition of the "Species Plantarum" of Linnæus, nor in Persoon's "Synopsis" is any important alteration made in the character of the genus, which, following Schreber, is referred by Willdenow to *Dodecandria*, and by Persoon to *Monadelphia*.

In 1804 Ventenat, in his "Jardin de la Malmaison¶," gives a considerably altered, and in most respects improved character of *Sterculia*, of which with some other genera of *Malvaceæ*, and the first section of Jussieu's *Tiliaceæ*, he proposes to form a new Natural Order, *Sterculiaceæ*, his principal distinguishing character of which has been already mentioned. He refers the genus to *Monadelphia Dodecandria* of the Linnean system for no very sufficient reason, namely the existence of the rudiments of the other sex in both the male and female flowers. He is the first to notice the *albumen bipartibile* and *radicula embryonis umbilico opposita* or *contraria*, both of which he introduces into the character of the genus. Besides these improvements in the account of the genus, he has given the distinguishing characters of several new species.

In 1805 M. Palisot de Beauvois, in his "Flore d'Oware et de Benin**," in describing his *Sterculia acuminata*, introduces several alterations into his character of the genus, most of which belong only to the species he has there described, and some of which may be considered of generic importance, especially the remarkable structure of antheræ.

In 1806 Salisbury proposes a new genus, *Southwellia*, formed of all such species of *Sterculia* as have the segments of the calyx connivent with cohering apices; this being the only character distinguishing it from the rest of the genus.

In the same year Poiret, in the article *Sterculia* of the Botanical Dictionary of the "Encyclopédie Méthodique††,"

* p. 106. † p. 284. ‡ p. 278. § p. 324.
‖ vol. iii. p. 546. ¶ vol. ii. fol. 91. ** vol. i. p. 40. †† vol. vii. p. 428.

considers the flowers as hermaphrodite, and adopts the explanation given by Forskael, Cavanilles and de Jussieu. In his generic character there is no improvement; but he suggests the probable expediency of afterwards dividing the genus, when the structure of the various plants referred to it is better known.

In 1819 Sir James (then Dr.) Smith, in Rees's "Cyclopedia," in his account of *Sterculia,* takes no notice of the structure of seed, and is inclined to agree with Schreber and Willdenow in referring it to *Dodecandria.* If the genus should be hereafter subdivided, he seems more disposed to trust to differences in the styles and stigmata than to those very remarkable modifications of fruit, with some of which he was acquainted, believing them not to be supported by other characters, and in proof of this instancing *St. platanifolia* and *colorata,* so similar in fruit and so unlike each other in the form of the flower.

In 1824 DeCandolle, in the first volume of his "Prodromus," forms a tribe which he calls *Sterculieæ,* consisting of *Sterculia* and *Heritiera,* referring it to *Buttneriaceæ.* The most remarkable circumstance in his character of *Sterculieæ,* is his describing the embryo as erect, which, if I rightly interpret his meaning, although applicable to a few species, is directly contrary to the more usual structure. *Sterculia* as a genus he distinguishes from *Heritiera* by the existence of albumen, which, however, is not universally present, and dehiscence of the follicles; the direction of embryo is not noticed in his characters of either of these two genera.

In 1827 M. Auguste de St. Hilaire, in the "Plantes Usuelles des Brasiliens," gives, appended to his account of a supposed new species of *Sterculia,* an improved character of the genus, though in this character he describes the albumen as a coat of the seed; the 'embryon antitrope' is considered as common to the whole genus. In the remarks that follow he supports Linnæus' account of his classification of the genus, in opposition to the observations of Jussieu which he refers to, but which he does not seem to be aware were adopted from Cavanilles, and perhaps also from Forskael, with whom a similar account originated.

In the same year he published a Livraison of his "Flora Brasiliæ Meridionalis," in which work, as in the "Plantes Usuelles," owing to the state of his health, he was assisted by MM. Adrien de Jussieu and Cambessèdes. In the "Flora Brasiliæ*" an enlarged, and in many respects improved character is given of *Sterculia,* of which the principal difference from that in the "Plantes Usuelles" is, his admitting the existence of albumen divided into two equal segments, which he correctly states frequently cohere with the corresponding cotyledons, the first distinct notice I believe of that remarkable economy: he states also, that where the seeds are ascendent, the radicle of the embryo points to the hilum, and where they are transverse, in the diametrically opposite direction. His character therefore of the genus is so framed as to include every species of *Sterculia* of DeCandolle, as far as the author was acquainted with their structure. It will hereafter appear, however, that neither is the existence of albumen universal, nor is the direction of the embryo dependent on that of the seed, even in the carpella of all the species then published.

In 1831, in the "Flore de Sénégambie," the joint work of MM. Guillemin, Perrottet and Richard, a new point is introduced into the character of *Sterculia*†, namely an incomplete arillus, which however, if it really exists in any case, is probably to be found in one species only, namely *Sterculia cordifolia*: in all the other species which I have examined there is either only a minute *caruncula umbilicalis* or *strophiola,* as in *St. fœtida,* or more generally no trace whatever of this appendage.

In 1832, in the "Meletemata Botanica" of Schott and Endlicher, the Natural Order *Sterculiaceæ* is divided into three principal tribes, *Bombaceæ, Helicteriæ,* and *Sterculieæ.* This last tribe, as in DeCandolle's "Prodromus," is limited to the genera *Sterculia* and *Heritiera.* But *Sterculia* is subdivided into twelve genera, chiefly from modifications of the flower, or from the texture and period of dehiscence of the folliculi, and in one case from the seed being winged; no modification of internal structure of seed being introduced into any of the characters.

In the same year the third volume of Dr. Roxburgh's "Flora Indica" was printed at Calcutta. In this valuable work such a generic character of *Sterculia*‡ is given as to comprehend all the Indian species, and indeed so

* vol. . p. 277. † vol. i. p. 79. ‡ p. 144.

constructed as to include all that are now known, except *Courtenia*, a new genus of the present essay; and even that would be excluded only from its generally having double the usual number of ovaria. Several new species are well described in the work, and the direction of embryo noticed in most of them; the only species in which the radicle is described as pointing to the umbilicus being his *Sterculia alata*.

In 1840 Professor Endlicher, in the 13th part of his "Genera Plantarum," modifies the arrangement of the Linnean genus *Sterculia* given in the "Meletemata," all the genera there established, except his *Pterygota* (the *St. alata* of Roxburgh), being considered as only subgenera of *Sterculia*, of which the principal characters distinguishing it from *Pterygota* are, as he states, orthotropous ovula and embryo either antitropous or parallel to the umbilicus. It would seem that these distinctions were adopted chiefly from the facts stated in the "Flora Indica" of Dr. Roxburgh, and in part also perhaps from the generic character of *Sterculia* given in the "Flora Brasiliæ."

In 1841 the same arrangement and characters are given in his "Enchiridion."

Before proceeding to the description and characters of *Sterculieæ* I have to make a few preliminary observations, chiefly on the relative importance of the different organs in the formation of genera.

In the general description of the tribe, I have enclosed in brackets such exceptions to the more usual structure as I believe to be in most cases of generic value.

The ordinary structure follows separately; no notice being taken of the exceptions which are numerous, and such parts of the general description being excluded as are of least importance, and it may be remarked that this character is but little different from that of the genus *Sterculia*.

I then give the few characters to which hitherto no exception has been found.

The direction of *Embryo* with relation to the insertion or umbilicus of the seed appears to be by far the most important character, or that which is best supported by other modifications of structure; and it is worthy of remark, that in this point the ordinary direction of the embryo in the tribe, namely the radicle seated at the opposite extremity or apex of the seed, is itself a deviation from the more usual structure of Phænogamous plants, and an exception not only to the other tribes of *Sterculiaceæ*, but to the whole of the Natural Class *Malvaceæ*, to which that order belongs; and it becomes still more remarkable in regard to the state of the unimpregnated ovulum, which I have some reason to believe is not orthotropous as might be expected, and as it has been described, but apparently anatropous, and that perhaps in the whole tribe. As, however, my observations on this subject are entirely made from the macerated ovaria of dried specimens, the statement here made must be received as requiring confirmation from the examination of living plants, and of a greater number of species*.

From this ordinary direction of embryo in the tribe the deviations are of two kinds: the first, and no doubt the more important, is that in which the radicle is placed at a point close to the umbilicus, which is the most general structure in Phænogamous plants; but as it never points directly within the umbilicus, either in this or any other family, I have modified the expression generally employed in such cases. The second deviation is where the umbilicus is placed on or near the middle of the ripe seed with the radicle pointing to its lower extremity; in other words, where the embryo is parallel to the umbilicus. But this position of umbilicus of the ripe seed does not necessarily imply an exactly similar insertion in the unimpregnated ovulum; and in this tribe I am inclined to believe, that in many cases the foramen of the ovulum is so close to the umbilicus as to appear ana-

---

* The species of *Sterculia* with orthotropous embryo in which I have found this unexpected position of foramen in the unimpregnated ovulum, are *fœtida*, *guttata*, *carthaginensis*, *nobilis* and *angustifolia*; and in the ripe seeds of *tragacanthæ*, *urens*, *villosa* and *quadrifida*, an indication of a lateral foramen near the base is still visible, but which in *fœtida* I have not been able to detect.

tropous, and that it ultimately becomes more distant from the unequal growth of the opposite extremities of the seed.

The exceptions to the ordinary structure in *Sterculieæ* which appear to be next in importance are the modifications in texture, and especially in the period of dehiscence of the seed-vessel or carpel, or even its nondehiscence, for in this respect the tribe admits of the two extremes. In the first, where the carpel opens long before the ripening of the seed, its texture is always foliaceous, and the embryo may be either transverse, that is having its radicle distant from the umbilicus, or approximated to it.

The want of *Albumen* in this tribe is also a character of considerable value, but its absence is not quite so frequent as has been supposed, there being some room for doubt where its union with the cotyledons is most intimate.

The deviations from ordinary arrangement of the *Antheræ* may be considered as next in value to those already enumerated; of these modifications, that of the greatest importance is where the antheræ are disposed in a simple series and equidistant; this occurs I believe only when either they are ten in number, or in the very rare case where they are reduced to five; the mere number, where they are not equidistant nor closely approximated, seems to be of much less importance.

The degrees of development of stamina in the female flower can never be employed in the formation of genera: in several, perhaps in many cases, the antheræ contain pollen, but on comparing it with that of the male flower, I am disposed to believe it to be imperfect or effete. It would seem at first sight, that, in the numerous cases where the style is deflected, the stigmata are so closely approximated to the antheræ that impregnation by their pollen is at least probable; but by this deflection of style the stigmata are equally exposed to the influence of the antheræ of the male flowers, which are generally lateral, while the female is terminal, the exposure being nearly equal whether the inflorescence is pendulous or erect.

The modifications of calyx in *Sterculieæ*, especially in the depth of division and direction of its segments, have hardly more than specific or sectional value; and even those processes which occur in several species, either in the segments or tube, seem to be of no greater importance. The most remarkable anomaly of all is the induplicate æstivation found in a single species belonging to New Holland and in *Sterculia villosa* of Roxburgh. This mode of æstivation readily passes into the valvular in the corolla of several families, and is therefore of no great weight.

It is singular that so great a difference as that between simple and compound leaves should in this tribe be unconnected with other characters, and the very few plants in which compound leaves occur differ widely from each other in the form of their flowers or direction of their segments.

STERCULIEÆ.

DESC. TRIBUS.—*Flores* diclines, monoici, *Masculi* cum rudimento, sæpiùs minuto et antheris occultato, pistilli: rarò stigmatibus ovulisque ferè ut in femineis. *Feminei* antheris manifestis sæpè donatis polline sed semper effœto. *Calyx* monophyllus, 5-fidus, nunc 5-partitus, rarò 4- v. 6-fidus, æqualis, coloratus; æstivatione valvatâ rarissimè induplicatâ; deciduus, quandoque marcescens. *Corolla* nulla. *Gynostemium*, columna genitalia sustinens, calyce breviùs v. longiùs rarò abbreviatum ferè nullum, in cujus apice *Antheræ* subsessiles quindecim, nunc decem, quandoque viginti (rarò quinque) urceolum abbreviatum cyathiformem rarissimè tubulosum terminantes, in capitulum inordinatim congestæ, v. in fasciculos quinque cum ovariis alternantes polyadelphæ (nunc dum decem v. quinque, sæpiùs in serie simplici dispositæ); biloculares, loculis distinctis, parallelis (rarò divaricatis). *Pollen* simplex, læve, sphæroideum. *Ovaria* 5, rarò 4 v. 6 (rarissimè 10—12), leviter cohærentia, polysperma (nunc tetra- v. disperma, rarò monosperma). *Ovula* angulo interno ovarii,

dum indefinita duplici rarò quadruplici serie, inserta. *Styli* tot quot ovaria, coaliti v. arctè approximati, et tunc sæpè arctè deflexi (nunc ad basin ferè distincti, quandoque nulli). *Stigmata* in unicum subcapitatum quinquilobum cohærentia, v. distincta subcylindracea indivisa. *Pericarpia: Folliculi* coriacei v. lignei (rarò submembranacei) haùd ante maturitatem seminum dehiscentes (in nonnullis in quibus ovula definita (2 v. 4) citò post fæcundationem aperientes, foliacei) (rarò clausi, nucamentacei). *Semina* aptera (rarissime apice alata), umbilico sæpè omninò nudo, quandoque strophiolâ parvâ, rarissimè si unquam? arillo carnoso incompleto? aucto. *Integumentum* triplex (in exalbuminosis simplex): dum triplex *extimum* quasi testæ lamina exterior, tenue, crustaceum, superficie interiore sæpiùs vasculosâ, inter hoc et medium substantia laxè cellulosa vel stuposa v. pulverea sæpè obvia; *medium* quasi testæ lamina interna, cartilagineo-nucamentaceum, evasculosum semper; *intimum* membranaceum, quandoque evanidum. *Albumen* amygdalino-carnosum, album, bipartibile! segmenta sæpiùs cotyledonibus cohærentia, in quibusdam cum iisdem conferruminata, et texturâ v. colore paulò diverso tantùm indicata quandoque nullum. *Embryo* dicotyledoneus, albus, longitudine albuminis, antitropus (nunc orthotropus v. transversus). Cotyledones in albuminosis latitudine albuminis et sæpiùs foliaceæ (in exalbuminosis semper carnosæ). *Radicula* v. hilo contraria et centrifuga (v. approximata et centripeta, v. transversa et infera). *Plumula* parva sed manifesta.—Arbores *intra tropica sæpiùs provenientes, et tamen omnes foliis deciduis.* Folia *alterna, petiolata, simplicia, indivisa v. lobata, rarò digitato-composita, foliolis cum petiolo articulatis: omnia pube sæpissimè stellatâ, in quibusdam nullâ, præsertim in paginâ superiore, v. in adultis deciduâ.* Petiolus *teretiusculus, basi et apice paullò incrassatis.* Stipulæ *laterales, distinctæ, plerumque subulatæ et caducæ.* Inflorescentia *sæpiùs paniculâta v. racemosa, pendula, quandoque fasciculis axillaribus v. rameis erectis:* bracteolis *caducis, pedicellis medio v. juxta apicem articulatis.*

CHAR. ORDINARIUS TRIBUS. *Flores* polygamo-monoici. *Calyx* 5-fidus, æstivatione valvatâ. *Corolla* nulla. *Genitalia* stipitem terminantia. *Antheræ* 15, congestæ v. polyadelphæ, biloculares; loculis parallelis. *Ovaria* 5, pluriovulata. *Styli* cohærentes. *Stigma* divisum v. lobatum. *Folliculi* ligneo-coriacei, polyspermi. *Embryo* rectus, longitudine albuminis bipartibilis. *Cotyledones* albumini cohærentes. *Radicula* hilo contraria.

CHARACTERES UNIVERSALES. *Flores* unisexuales. *Calyx* coloratus, æqualis, æstivatione valvata rarò ejusdem modificatione induplicata. *Corolla* 0. *Stamina* hypogyna. *Antheræ* biloculares. *Pericarpia* distincta.

STERCULIA.

Sterculiæ pars *auctorum ferè omnium.*

CHAR. GEN. *Calyx* 5-fidus (rarò 4-fidus). *Antheræ* v. inordinatim congestæ v. polyadelphæ. *Ovaria* pluriovulata. *Styli* cohærentes (in unicum sæpiùs arctè deflexum). *Stigmata* in unicum 5-lobum coalita quandoque distincta. *Folliculi* lignei v. coriacei. *Semina* albuminosa; albumine bipartibili cum cotyledonibus plùs minùs arctè cohærenti. *Embryonis radicula* hilo contraria.—Arbores *intra tropicos Asiæ (et insularum adjacentium) Africæ et Americæ provenientes.* Folia *indivisa, v. lobata, v. in paucis digitatim composita.* Inflorescentia *v. paniculata*

v. racemosa, in plerisque nutans ; floribus *terminalibus sæpiùs præcocioribus et femineis, et in his stylus arctè deflexus.*

* *Folia composita, digitata : foliolis cum petiolo articulatis et separatim solubilibus.*

Calycis laciniæ patulæ.

Sterculia (*fœtida*) foliolis 7—5 elliptico-lanceolatis acuminatis petiolatis vix quadruplo longioribus quam latis utrinque glabris.

S. fœtida, *Linn.*, *DeCand.*

Loc. Nat. India orientalis, Insulæque Moluccanæ.

Obs. Varietatem in orâ septentrionali Novæ Hollandiæ, anno 1802, legi cujus venæ primariæ subflexuosæ et magis deliquescentes.

S. (*polyphylla*) foliolis 9—11 lineari-lanceolatis elongatis sessilibus sexies longioribus quam latis utrinque glabris.

Loc. Nat. E Sumatra, ad fretum Sunda, folium unicum reportavit D. G. Staunton (v. s.).

Obs. Figura Clompani majoris, *Rumph. Amb.* iii. t. 107, sat benè respondet, arboremque juvenilem biorgyalem, foliis omnibus sumatrano similibus, in Hort. Reg. Paris. cultam anno 1843 vidi.

S. (*mexicana*) foliolis 7 cuneato-oblongis basi attenuatis petiolatis glaberrimis, floribus (masculis) paniculatis, calycibus intus barbatis.

Loc. Nat. Mexico ad Chiapas D. Linden v. s. in Herbb. Hort. Paris. et D. Delessert.

Obs. Feminei flores et pericarpia desiderantur ideoque genus incertum.

* *β. Calycis laciniæ conniventes, apicibus diù cohærentibus.*

S. (*versicolor*) foliolis oblongo-ellipticis acuminatis subtùs tomentosis.

S. versicolor, *Wall.*, *Pl. asiat. rar.* i. p. 48. tab. 59.

Loc. Nat. Ind. or. ad ripas Irrawaddi D. Wallich.

Obs. Fructus ignotus.

** *Folia simplicia, aliqua v. omnia lobata. Calycis laciniæ* ;

S. (*urens*) foliis 3—5-lobis subtùs tomentosis velutinis, paniculis compositis erectis, calycis laciniis basi lingulâ deflexâ, floribus decandris urceolo antherarum cylindraceo, stylo erecto.

S. urens, *Roxb. Corom. pl.* i. p. 25, t. 24.

Loc. Nat. India orientalis, Roxburgh.

S. (*villosa*) foliis 5—7-lobis acuminatis subtùs tomentosis velutinis, paniculis compositis pendulis, calycis æstivatione induplicata ! stylo deflexo.

S. villosa, *Roxb. Fl. ind.* iii. p. 153.

Loc. Nat. Ind. or., Roxburgh.

S. (*abyssinica*) foliis 3—5-lobis adultis supèr glabris subtèr pubescentibus, racemis (femineis) subsimplicibus nutantibus, calycibus glabriusculis : laciniis intùs extra medium villosis, columna genitalium glaberrimo calyce breviore, stylo recurvo, folliculis polyspermis intus setosis.

S. abyssinica, *R. B. in Salt, Trav. app.*, p. lxiv.

Loc. Nat. Abyssinia, D. Salt.

S. (*tomentosa*) foliis cordatis plerisque trilobis adultis utrinque tomentosis velutinis, floribus racemosis pendulis, calycibus extùs tomentosis, stipiti genitalium piloso.

S. tomentosa, *Guillem.*, *Perrottet et Richard*, *Flor. senegamb.*, i. p. 81, tab. 16.

Loc. Nat. Africa æquinoctialis.

Obs. S. abyssinicæ nimis affinis.

S. (*Triphaca*) foliis reniformibus acutis indivisis obsoletè trilobisve adultis supèr glaberrimis subtèr glabriusculis, ovariis 2—3, stylo recurvo, stigmate lobato-capitato.

Triphaca africana, *Lour. Cochin.*, 577. (et *DeCand. Prodr.*) fid. fragm. ab ipso Loureiro in Herb. Mus. Paris.

Loc. Nat. Africa orientali-australis contra Mozambique, Loureiro.

S. (*carthaginensis*) foliis 3—5-lobis obtusis acutiusculisve cordatis adultis supèr glabratis subnitentibus subtèr velutino-tomentosis cinereis venulis immersis, calycibus extùs furfuraceo-tomentosis intùs glabris, stylo recurvo.

S. carthaginensis, *Cav. Diss.* vi. p. 353.

S. Helicteres, *Pers. Syn.* ii. p. 240. *DeCand. Prodr.* i. p. 483.

S. Chicka, *Aug. Ste. Hil. Pl. usuell. des Brasil.*, tab. 46, *et Fl. Brasil. merid.*, i. p. 278, fid. exempl. ab ipso Auct. in Herb. Mus. Paris.

Helicteres apetala, *Jacq. Amer.*, p. 238, ubi desc. opt. cum ic. flor. in tab. 181. fig. 97, fide floris unici feminei in Herbario ipsius Jacquin in Museo Britannico asservato.

Obs. Ab hâc vix differt *Chichæa aserifolia*, Presl, Reliq. Hænck, ii. p. 141, quamvis ad plantam suam stylum erectum attribuit; et hujus loci forsan *St. punctata*, DeCand. Prodr. i. p. 483, vix obstante foliorum lobis acuminatis figuræ ineditæ.

S. (*striata*) foliis 3—5-lobis acutiusculis obtusisve cordatis adultis supèr glabris non nitentibus subtèr pubescentibus rugosis venulis emersis, calycibus extùs pilosis.

S. striata, *Aug. Ste. Hilaire et Naudin. in Annal. des sc. nat., ser.* 2. *tom.* xviii. *bot. p.* 213.

Loc. Nat. Brasilia, v. Martius (in cujus herb. S. chicka) et D. Gardner.

*** *Folia simplicia, omnia indivisa.*

a. Calyx 5-partitus, patens; laciniis medio intùs lingulâ (squamulâ abbreviatâ) auctis. Antheræ decem, sed subcongestæ (nec æquidistantes).

S. (*Ivira*) foliis ovato-oblongis acutis basi obtusâ (nec cordatâ) adultis supèr glabris subtèr petiolisque tomentosis.

Ivira pruriens, *Aubl. Guian.*, p. 695, t. 279. Character ab ipso exemplari Aubletii in Herb. Banks. Mus. Brit.

S. Ivira, *Sw. Prodr.* p. 98, *Flor. Ind.-occident.* ii. p. 1160.

Obs. Character specific. et descr. Swartzii præsertim e descriptione Aubletii deprompta est, sed partim a sequenti.

S. (*caribæa*) foliis ovato-oblongis acutis basi obtusâ adultis supèr petiolisque glaberrimis subtèr glabriusculis.

Loc. Nat. In Insulis Caribæis legit De Ponthieu.

S. (*propinqua*) foliis oblongo-ovatis acutis basi cordatâ subtèr tomentosis.

Loc. Nat. A Surinam misit *D. Hostmann.*

Obs. A *S. Ivira* foliis basi cordatâ præsertim et vix aliter differt.

S. (*frondosa*) foliis ad apicem ramuli confertis oblongis obtusissimis basi obtusiusculâ lævibus adultis supèr glaberrimis nitidis subtèr glabris venulis altè immersis, racemis axillaribus pedunculatis divisis.

Sterculia frondosa, *Richard in Act. soc. hist. nat. paris.*, p. 111.

Loc. Nat. Guiana Gallica, *D. Richard.*

S. (*Surinamensis*) foliis ad apicem rami confertis oblongis obtusissimis basi obtusiusculâ adultis utrinque pubescentibus venulis subtèr parùm emersis, racemis axillaribus pedunculatis divisis.

Loc. Nat. A Surinam misit *D. Hostmann, v. s.* in Herb. D. Hooker.

S. (*rugosa*) foliis oblongis obtusissimis venis venulisque subtèr prominentibus rugosis.

Loc. Nat. In Demerarâ detexit *A. Anderson,* Horti Botanici Ins. Sti Vincentii tunc præfectus.

*** β. *Calyx patens, laciniis absque lingulâ.*

S. (*guttata*) foliis oblongo-ovatis acutis acuminatisve basi obtusâ subcordatâ adultis subtèr tomentosis, racemis axillaribus indivisis, floribus subternis subsessilibus, calycibus extùs furfuraceo-tomentosis intùs villosis.

Sterculia guttata, *Roxb. Fl. ind.* iii. p. 148.

α. folia oblongo-ovata acuta.

β. folia obovata-acuminata, racemis folio multotiès brevioribus.

Loc. Nat. Ind. Or., *D. Roxburgh.*

S. (*Madagascariensis*) foliis oblongis altè cordatis obtusis adultis utrinque glaberrimis, racemis compositis, pedunculis calycibusque extùs pube stellari cinereis.

Loc. Nat. Madagascar, *D. Richard de Bourbon in Herb. Mus. Paris.*

S. (*Roxburghii*) foliis ovalibus oblongisve acuminatis basi obtusâ utrinque glabris, racemis axillaribus folio brevioribus, calycibus profundè 5-fidis : laciniis lanceatis imberbibus.

Sterculia Roxburghii, *Wall. List*, n. 1124.

Sterculia lanceæfolia, *Roxb. Fl. ind.* iii. p. 150.

Loc. Nat. Ind. Or., Sillet, *Dr. Wallich.*

S. (*lanceolata*) foliis elliptico-lanceolatis acutis basi acutiusculâ adultis utrinque glabris, paniculis axillaribus folio brevioribus, calycibus quinquepartitis patulis imberbibus glabriusculis.

Sterculia lanceolata, *Cav. Diss.* v. p. 287, t. 143. f. 1. *Lindl. in Bot. regist.*, 1256.

Loc. Nat. China.

S. (*parvifolia*) foliis lanceolatis utrinque glaberrimis acutis subacuminatisve basi acutâ, racemis axillaribus simplicibus folio brevioribus.

Sterculia parvifolia, *Wall. List*, n. 1123.

Loc. Nat. Ins. Penang, *Dr. Wallich.*

S. (*Javanica*) foliis obovatis acumine brevissimo basi obtusâ subcordatâ subtèr tomentosis, paniculis cernuis, calycibus patulis utrinque tomentosis.

Sterculia cordata, *Blume Bijdr.*, p. 86 ?

Loc. Nat. Java, *Dr. Horsfield.*

S. (*macrophylla*) foliis altè cordatis obtusis indivisis subtèr tomentosis, paniculis lateralibus cernuis, calycibus 5-fidis patentibus.

Sterculia macrophylla, *Vent. Malm.* ii. n. 91 *in adnot. DeCand. Prodr.* i. p. 483.

Loc. Nat. Java, *Dr. Horsfield.*

S. (*comosa*) foliis ovatis cordatis acuminatis subtèr tomentosis, paniculis decompositis, calycibus patentibus.

Sterculia comosa, *Wall. Pl. asiat. rar.* ii. p. 25, t. 127.

Loc. Nat. Amboina, *in Hort. Calc cult.*, *Wallich.*

S. (*longifolia*) foliis oblongis acutiusculis glabris, racemis subsimplicibus, pedicellis subgeminis folio brevioribus, calycis laciniis patentibus intùs barbatis tubum extùs glabriusculum subæquantibus.

Sterculia longifolia, *Vent. Malm.* ii. n. 91 *in adnot.* fid. specim. in Herb. Vent.

Obs. Cfr. Sterculiam lanceolatam, *Blume, Bijdr.* quoad folia et inflorescentiam similem sed calycis laciniis conniventibus et apice connexis diversam.

Loc. Nat. Java, *Dr. Horsfield.*

S. (*lævis*) foliis oblongo-lanceolatis acumine lineari obtuso basi acutiusculis utrinque glabris, racemis subsimplicibus folio brevioribus, calyce extùs glabro : laciniis patentibus tubo duplò longioribus e latâ basi linearibus intùs barbatis.

Sterculia lævis, *Wall. List*, n. 1138.

Sterculia coccinea, *Jack in Mal. miscel.* i. *non Roxburgh.*

Loc. Nat. Pulo Pinang.

S. (*Spangleri*) foliis lanceolato-oblongis acutis subacuminatisve utrinque glabris, racemis subcompositis, calycibus extùs glabris : laciniis patentibus e latiore basi subulatis intùs barbatis tubo duplò longioribus.

Obs. Proxima *Sterculiæ lævi* et *longifoliæ* ; ab illâ foliorum latiorum et basi obtusiorum acumine breviore et ab apice folii sensim angustato nec subitò constricto et lineari ; ab hâc præsertim calycis laciniis tubo duplò longioribus diversa.

Loc. Nat. Java, *D. Spangler in Herb. D. Hooker.*

S. (*coccinea*) foliis lanceolatis subacuminatis basi obtusiusculâ adultis utrinque glabris, paniculis axillaribus cernuis, calyce extùs glabro : laciniis e latâ basi filiformibus barbatis tubo abbreviato 4—5-plò longioribus.

β. folia cuneato-lanceolata, racemi subsimplices folio breviores.

Sterculia coccinea, *Roxb. Fl. ind.* iii. p. 151. *Wall. List*, n. 1122.

Loc. Nat. α. Sillet, *Roxb.*, *Wall.* β. Assam, *D. Griffith.*

Obs. Ad hanc sectionem forsan referendæ Helicteres undulata et paniculata, *Lour. Cochin.*, p. 531: et ad eandem primo intuitu pertinere videtur Sterculia punduana, *Wall. List*, n. 2701, quæ autem Reevsia species est, R. Wallichii, *nob.*

*** γ. *Calycis laciniæ conniventes apicibus diù cohærentibus.*

S. (*nobilis*) foliis ovali-oblongis brevè acuminatis basi obtusâ utrinque glabris, paniculis pendulis calycibusque extùs pube rarâ conspersis, stigmatibus subrotundis stylo deflexo multoties brevioribus.

Sterculia monosperma, *Vent. Malm.* ii. n. 91.

Sterculia Balanghas, *Roxb. Fl. ind.* iii. p. 144, *non Linnæi.*

Southwellia nobilis, *Salisb. Parad. lond.*, t. 69. exclus. synn. Linnæi, Cavanilles et Hort. Malab.

Loc. Nat. China; in Hort. Bot. Calc. et Europæis culta.

S. (*Balanghas*) foliis oblongo-ovalibus obtusiusculis v. acumine brevissimo obtuso basi obtusâ (nec cordatâ) adultis supèr glabris subtèr pubescentibus, paniculis calycibusque extùs tomentosis: laciniis intùs densè barbatis, folliculis polyspermis extùs tomentosis intùs glabris.

Sterculia, *Linn. Flor. zeyl.*, n. 350, *fide speciminum Herb. Hermanni*, vol. ii. fol. 42.

Sterculia Balanghas, *Linn. Sp. pl.* ed. 1. p. 1007.

Cavalam, *Hort. malab.* i. p. 89, t. 49.

Loc. Nat. Zeylona et Peninsula Indiæ Orientalis.

Obs. Hujus varietas ut videtur foliis acutis acutiusculisve nec unquam constrictè acuminatis, petiolis adultis pubescentibus, ex Herb. D. Wight, et probabiliter illius *S. Balanghas*, Illustr., tab. 30.

S. (*angustifolia*) foliis oblongo-lanceolatis attenuato-acuminatis basi obtusâ adultis supèr glabriusculis subtèr copiosè pubescentibus, paniculis nutantibus folia superantibus, calycibus extùs tomentosis: laciniis intùs modicè barbatis tubo longioribus, stigmatibus distinctis recurvis stylum æquantibus.

Sterculia angustifolia, *Roxb. Fl. ind.* iii. p. 148. *Wall. List*, n. 1133.

Loc. Nat. Nepalia.

S. (*mollis*) foliis elliptico-oblongis acutis acuminatisve basi obtusâ adultis supèr pube rarâ scabriusculis subtèr velutino-tomentosis, paniculis laxis nutantibus ramulis pedicellisque capillaribus pilis patulis, calycibus extùs tomentosis: laciniis intùs barbatis longitudine tubi hemisphærici, stigmatibus distinctis stylum æquantibus folliculis polyspermis extùs velutinis intùs pilosiusculis.

Sterculia mollis, *Wall. List*, n. 1131, *fid. sp. Herb. Wallichiani in Museo Soc. Linn. Lond.*

Loc. Nat. Martabania, *Dr. Wallich.*

S. (*rubiginosa*) foliis cuneato-oblongis acutis v. constrictè acuminatis basi obtusâ adultis supèr glabris subtèr pubescentibus venoso-rugosis, stipulis longitudine petiolorum, paniculis folia vix

æquantibus, calycibus extùs tomentosis: laciniis intùs densè barbatis tubum turbinatum superantibus.

Sterculia rubiginosa, *Vent. Malm.* ii. fol. 91 *in adnot. fide specim. in Herb. D. de Jussieu et D. Smith a Thouin.*

Sterculia angustifolia, *Jack in Mal. miscell.*, vol. i.

Sterculia Jackiana, *Wall. List*, n. 1134, *sec. specimina in Herb. Wallich. Musei Soc. Linn.* e quibus character specif. desumptus.

Loc. Nat. Java, *Ventenat.* Pulo Pinang et Singapore, *Jack et Wallich.*

S. (*cuneata*) foliis cuneato-obovatis ellipticisve acutiusculis basi obtusâ adultis supèr glabris subtèr pubescentibus, petiolis stipulas subulatas vix æquantibus, racemis terminalibus subsimplicibus, calycis laciniis intùs strigoso-barbatis tubo cyathiformi longioribus.

Loc. Nat. Insulæ Philippinæ, *D. H. Cuming.*

S. (*ferruginea*) foliis oblongo-lanceolatis attenuato-acuminatis basi obtusiusculâ adultis supèr glabris subtèr pubescentibus venoso-rugosis, ramulis petiolis calycibusque extùs ferrugineo-tomentosis, racemis subcompositis, calycis laciniis tubo duplò longioribus, stigmatibus recurvis stylo arctè deflexo dimidio brevioribus.

Loc. Nat. Ins. Philippinæ, *D. H. Cuming.*

S. (*stipularis*) foliis cuneato-oblongis acuminatis membranaceis basi cordatâ adultis supèr glabriusculis subtèr petiolisque undique tomentosis, stipulis petiolos æquantibus, racemis compositis elongatis pendulis furfuraceo-pubescentibus, calycis laciniis intùs strigoso-barbatis tubo turbinato paulò longioribus.

Loc. Nat. Insulæ Philippinæ, *D. H. Cuming.*

S. (*oblongata*) foliis oblongis acutiusculis basi obtusissimâ adultis supèr glaberrimis subtèr glabriusculis, paniculâ foliis (spithameis—pedalibus) breviore, calycis laciniis tubum urceolatum glabriusculum vix æquantibus subulatis pubescentibus demùm solutis.

Loc. Nat. Insulæ Philippinæ, *D. H. Cuming.*

S. (*grandifolia*) foliis cuneato-oblongis basi (apiceque ?) obtusis adultis glabris, racemis simplicibus petiolo elongato brevioribus, calycis laciniis linearibus utrinque tomentosis: tubo brevissimo.

Loc. Nat. Java, *Spangler in Herb. D. Hooker.*

S. (*cuspidata*) foliis oblongo-ovatis acumine lineari basi obtusis utrinque glaberrimis, racemis simplicibus, calycibus extùs glabris: laciniis subulatis intùs pilosiusculis tubum turbinatum æquantibus.

Loc. Nat. Sumatra, *D. Raffles.*

S. (*insularis*) foliis ovali-oblongis acutis basi obtusâ utrinque glabris, floribus paniculatis, calycis tubo turbinato glabro lacinias intùs barbatas demùm distinctas et patentes æquante.

Loc. Nat. Insula Moluccana Honimoa, *Ch. Smith.*

S. (*parviflora*) foliis oblongo-ovatis acuminatis basi transversâ subcordatâ adultis subtèr tenuissimè

pubescentibus, floribus 5-fidis paniculatis tomento adpresso, calycis tubo urceolato laciniis adpressè tomentosis longiore.

Sterculia parviflora, *Roxb. Fl. ind.* iii. p. 147. *Wall. List*, n. 1121.

Loc. Nat. Sillet, *Roxburgh et Wallich.*

S. (*quadrifida*) foliis ovatis cordatis acutis obtusiusculisve adultis utrinque glabris, floribus subpaniculatis plerisque 4-fidis, calycibus extùs laciniisque tubum urceolatum æquantibus intùs tomentosis.

α. folia obtusiuscula, tomentum paniculæ et calycis haud adpressum.

β. folia acuta, tomentum paniculæ et calycis extùs subadpressum.

Loc. Nat. Nova Hollandia ; α. in orâ orientali, β. in orâ septentrionali, ann. 1803.

S. (*urceolata*) foliis ovatis ellipticisve acutis basi obtusâ adultis glabriusculis, floribus paniculatis, calyce tomentoso : laciniis tubum ovatum subæquantibus intùs barbatis pilis strictis.

Sterculia urceolata, *Smith in Rees's Cyclop.* : fid. exempl. in Herb. Smith. in Mus. Soc. Linnean. an hujus loci *S. Candollei*, Wall. Pl. asiat. rar. i. p. 4, quæ *Sterculia populifolia* α, De Cand. Prodr. i. p. 483 ?

Loc. Nat. Honimoa, Ins. Moluc., *Ch. Smith.*

S. (*ceramica*) foliis ovatis subcordatis acutiusculis adultis utrinque paniculisque glabris, calycibus glaberrimis alabastro obtuso.

Loc. Nat. Insula Moluccana Ceram, *Ch. Smith.*

Obs. An laciniæ calycis apice connexæ ?

S. (*Tragacanthæ*) foliis ovatis acutis basi obtusâ adultis supèr pube rarâ conspersis subtèr tomentosis, calycis laciniis tubum turbinatum æquantibus.

Sterculia Tragacanthæ, *Lindl. in Bot. regist.*, 1353.

Loc. Nat. Africa Æquinoctialis prope Sierra Leone.

S. (*obovata*) foliis obovatis acumine brevissimo basi obtusâ adultis supèr glabriusculis subtèr pubescentibus, folliculis tomentosis.

Loc. Nat. Africa Æquinoctialis ad flumen Congo, *Christian Smith.*

Tetradia.

Char. Gen. *Calyx* 4-part. (nunc 3-part.). *Antheræ* 8, simplici serie, loculis omnibus parallelis. *Ovaria* 4, ovulis numerosis. *Stigmata* recurva.

Arbor (Javanica) foliis indivisis, racemis axillaribus brevibus monoicis, floribus hermaphroditofemineis columna nulla, aliquoties majoribus masculo cui columna manifesta gracilis et rudimenta minuta pistilli.

Obs. Pericarpia et Semina ignota statio generis ? incerta : propè Brachychiton posui ob ovula basi parum obliqua foramen hilo proximum indicante.

Tetradium, *Lour. cochin.*, p. 91. fide exemplaris ab auctore ad D. Banks missi Fagaræ species est.

Tetradia *Horsfieldii.*

Loc. Nat. Java, *Dr. Horsfield.*

BRACHYCHITON.

Sterculiæ subgenera sequentia. Brachychiton, Poecilodermis et Trichosiphon, *Endl. Gen.*, p. 994.

CHAR. GEN. *Calyx* 5-fidus. *Antheræ* congestæ. *Styli* cohærentes. *Stigmata* distincta, v. in unicum peltatum coalita. *Folliculi* coriaceo-lignei, polyspermi. *Semina* albuminosa, pube stellari tecta mutuò et fundo folliculi cohærentia. *Embryonis radicula* hilo proxima!—Arbores (Novæ Hollandiæ) *foliis lobatis indivisisve.*

* *Calycis æstivatio induplicata (tubus squamis numerosis inflexis).* Sterculiæ subgenus BRACHYCHITON, *Endl.*

BRACHYCHITON (*ramiflorum*) foliis cordatis circumscriptione subrotundis trilobis obtusis utrinque folliculisque extùs tomentosis.

Loc. Nat. In orâ septentrionali Novæ Hollandiæ ann. 1802—3 legi.

** *Calycis æstivatio valvata.*

Br. (*incanum*) foliis altè 5-lobis tomentosis subtèr incanis: lobis acuminatis, folliculis extùs tomentosis.

Obs. Æstivatio ignota, an induplicata?

Loc. Nat. In orâ septentrionali Novæ Hollandiæ ann. 1819 legit b. A. Cunningham.

Br. (*platanoides*) foliis altè 5-lobis acutis glabris, racemis subsimplicibus, calyce infundibuliformi, stigmate peltato, folliculis extùs glabris.

Trichosiphon, *Endl. Gen.*, p. 994.

Loc. Nat. In orâ orientali, intra tropicum, Novæ Hollandiæ ann. 1802 legi.

Br. (*populneum*) foliis ovatis acuminatis indivisis trilobisve basi acutâ v. obtusâ glaberrimis, racemis axillaribus subsimplicibus, calycibus campanulatis, folliculis elongato-stipitatis.

Poecilodermis, *Endl. Gen.*, p. 994.

Loc. Nat. In orâ orientali, extra tropicum, Novæ Hollandiæ ânn. 1803—4 legi.

Br. (*diversifolium*) foliis ovatis elongato-acuminatis basi obtusâ v. cordatâ glaberrimis (quandoque oblongis linearibusve), folliculis extùs glabriusculis abbreviato-stipitatis.

Loc. Nat. In orâ septentrionali Novæ Hollandiæ ann. 1803 legi.

PTERYGOTA, *Endl. Gen.*, p. 995.

CHAR. GEN. *Calyx* 5-partitus. *Antheræ* congestæ v. polyadelphæ. *Stigmata* distincta. *Folliculi* lignei, polyspermi. *Semina* apice alata! albuminosa. *Radicula embryonis* hilo proxima.—Arbor (Indiæ Orientalis) *foliis indivisis.*

PTERYGOTA *alata.*

Sterculia alata, *Roxb. Coromand.* iii. p. 84, t. 287.

Loc. Nat. Ind. Or., Silhet et Chittagong, *D. Roxburgh.*

HILDEGARDIA, p. 994.

Sterculiæ subgenus HILDEGARDIA, *Endl. Gen.*

CHAR. GEN. *Calyx* 5-partitus. *Antheræ* congestæ. *Folliculi* membranacei, venosi, apice alati, tardiùs dehiscentes. *Semina* albuminosa. *Radicula embryonis* hilo proxima.—Arbor (Indiæ Orientalis) *foliis cordatis indivisis.*

HILDEGARDIA *populifolia.*

Sterculia populifolia, *Roxb. Fl. ind.* iii. p. 148. *Wall. Pl. asiat. rar.* i. p. 3, t. 3.

Loc. Nat. Ind. Or., *Roxburgh et Wallich.*

FIRMIANA, *Marsili in Act. Patav.* i. p. 116, t. 1 et 2.

Sterculiæ subgenera FIRMIANA et ERYTHROPSIS, *Endl. Gen.*, p. 994.

CHAR. GEN. *Calyx* v. 5-partitus tubo brevissimo, v. tubulosus semiquinquefidus. *Antheræ* (15) congestæ v. polyadelphæ. *Styli* coaliti, *stigmate* lobato. *Pericarpia* longè ante maturitatem aperientia, membranacea, foliiformia. *Semina* 2—4, albuminosa. *Embryo* transversus ; *Radicula* infera.—Arbores Asiatici (Chinensis et Indiæ Orientalis) *foliis lobatis.*

* *Calyx 5-partitus ; tubo brevissimo fasciculis quinque pilorum intùs barbato.* Sterculiæ subgenus FIRMIANA, *Endl. Gen.*

FIRMIANA *platanifolia.*

Sterculia platanifolia, *Linn. fil. Suppl. Plant.* p. 422.

Sterculia pyriformis, *Bunge in Act. Petrop. sav. etrang.* ii. p. 83. fid. exemplo e Mus. Acad. Petrop. in Herb. D. Hooker.

Sterculia tomentosa, *Thunb. Ic. pl. Japon. dec.* 4.

Loc. Nat. China et Japonia.

** *Calyx tubulosus quinquedentatus v. semiquinquefidus ; tubo intùs fasciculis* 5 *pilorum.* ERYTHROPSIS, *Lindl.* Sterculiæ subgenus ERYTHROPSIS, *Endl. Gen.*

F. *colorata.*

Sterculia colorata, *Roxb. Coromand.* i. p. 26, t. 25.

α. calyx extùs furfuraceo-pubescens, pube stellari radiis abbreviatis rigidis : tubo dentibus ferè quater longiore foliis adultis subtùs glabriusculis.

β. calyx extùs furfuraceo-pubescens, pube stellari radiis abbreviatis rigidis : tubo dentibus quater et ultra longiore, foliis adultis subtùs pube copiosa scabris.

St. fulgens, *Wall. List,* n. 1135.

Forsan distincta species.

γ. calyx extùs pube stellari radiis laxis patentibus velutino : tubo dentibus vix ter longiore.

An species distincta ?

Loc. Nat. Ind. Or. et Ins. adj., *Roxburgh et Wallich.*

SCAPHIUM.

Sterculiæ subgenus SCAPHIUM, *Endl. Gen.*

CHAR. GEN. *Flores* monoici. *Calyx* 5-fidus. *Antheræ* (15) congestæ. *Ovaria* disperma. *Styli* coaliti. *Stigma* 5-lobum. *Pericarpia* longè ante maturitatem aperientia, foliacea, navicularia. *Semen* unicum, albuminosum? *Embryonis radicula* hilo proxima.—Arbor (Indiæ Orientalis) *foliis indivisis*.

SCAPHIUM *Wallichii*.

Sterculia scaphigera, *Wall. List*, n. 1130.

Loc. Nat. Martabania, *Wallich*.

PTEROCYMBIUM (*v. suprà*).

COURTENIA

CHAR. GEN. *Calyx* 5- (raro 4-) fidus, patens. *Antheræ* (10) simplici serie æquidistantes; loculis omnibus parallelis. *Ovaria* 10! (nunc 11—12, raró 5?). *Stigmata* 10 recurva (stylo brevissimo). *Folliculi* crassi, polyspermi. *Semina* exalbuminosa. *Radicula* hilo proxima. —Arbores (Africæ Æquinoctialis); foliis *altè lobatis*; floribus *sæpius congestis*.

COURTENIA *Afzelii*, caudice simplicissimo, foliis palmato 5—3-lobis cordatis: lobi medii dimidio inferiore angustiore, floribus caulinis congestis.

Loc. Nat. Africa Æquinoctialis prope Sierra Leone et Congo. In Hort. Reg. Kew. florentem vidi ann. 1808 et 1843.

C. *triloba*, foliis circumscriptione cuneatis basi obtusa palmato-trilobis: lobi medii dimidio inferiore haud angustiore, floribus axillaribus congestis.

Loc. Nat. Africa Æquinoc., Senegambia, *Hudelot in Mus. Paris. et Herb. D. Delessert.*

C. ? *heterophylla*, foliis palmato-trilobis indivisisve basi cuneata, racemis laxis, ovariis quinque.

Sterculia heterophylla, *Palis. Fl. d'oware*, p. 67, t. 40.

Loc. Nat. Africa Æquinoct., Oware.

Obs. Fructus ignotus ideoque et ob ovaria tantum quinque dubii generis planta, sed habitus ferè Courteniæ trilobæ quacum etiam convenit antherarum dispositione et numero, defectu columnæ et stigmatum forma.

COLA.

Sterculiæ subgenus COLA, *Endl. Gen.*

CHAR. GEN. *Calyx* 5-fidus, patens. *Antheræ* (10) simplici serie; loculis divaricatissimis! *Ovaria* multiovulata. *Stigmata* sessilia, distincta, filiformia. *Folliculi* dehiscentes, polyspermi (quandoque monospermi). *Semina* exalbuminosa. *Radicula embryonis* hilo proxima.— Arbores *foliis indivisis glabris*.

Obs. Ad hoc genus vix pertinet planta e Sierra Leone, ab Afzelio lecto, habitu quidem simili, stipiti genitalium nullo, stigmatibus distinctis, sessilibus, floribus axillaribus, foliis cuneato-ellipticis basi attenuatis utrinque glaberrimis glabris, sed diversa antherarum loculis parallelis.

COLA *acuminata*, foliis elliptico-oblongis acuminatis basi acutiuscula adultis utrinque glabris, calycibus altè 5-fidis, genitalibus sessilibus.

Sterculia acuminata, *Palis. Flor. d'oware*, i. p. 41, t. 24.

——— grandiflora, *Vent. Malm.* ii. p. 91 *in adnot.*, ramulus cum racemo hermaphrodito-femineo.

——— nitida, *Vent. Malm.*, l. c., ramulus floribus masculis.

——— macrocarpa, *Don, Dict.* i. p. 515.

——— verticillata, *Schumach. Plant. guin.*, p. 240.

——— oblongifolia, *DeCand. Prodr.* i. p. 482 ?

Lunania Bichy, *DeCand. Prodr.* ii. p. 92.

Loc. Nat. In Africâ Æquinoctiali ad Sierra Leone, Congo; a nigritis olim in Antillis introducta; culta etiam in Brasiliâ, Mexico ?, et Insulâ Mauritii.

C. *cordifolia*, foliis orbiculato-ovatis cordatis indivisis passimque semitrilobis adultis subtèr pubescentibus, calycibus urceolatis semi-5-fidis, genitalibus brevissimè stipitatis.

Sterculia cordifolia, *Cav. diss.* v. p. 286, t. 143. f. 2. (exclus. fruct. ad St. tomentosum sec. auctores flor. senegamb. pertinenti), *Guillm. Perrottet et Richard, Flor. senegamb.*, p. 79. t. 15.

Loc. Nat. Africa Æquinoct., Senegambia.

Obs. Ad Colam retuli præsertim ob antherarum loculos divaricatissimos, semina exalbuminosa et radiculam embryonis hilo proximam, attamen differt a C. acuminata floribus (multotiè sminoribus) suburceolatis 5-dentatis et, secundum D. Perrottet, seminibus arillatis, necnon habitu.

HERITIERA, *Dryand. in Hort. Kew.* ed. 1. iii. p. 546.

CHAR. GEN. *Calyx* 5-fidus. *Antheræ* 5. *Ovaria* uniovulata! *Pericarpia* folliculiformia, lignea, clausa, dorso alata. *Semen* exalbuminosum. *Radicula* hilo proxima.—Arbores (Asiaticæ) *littoreæ*; foliis *indivisis* subtùs lepidotis squamulis incisis; floribus *axillaribus subpaniculatis*.

HERITIERA *littoralis*, foliis elliptico-oblongis ovatisve obtusiusculis.

Heritiera littoralis, *Dryandr. in Ait. Kew.* ed. 1. vol. iii. p. 546.

H. fomes, *Buchanan in Sym. Ava. Willd. sp.* iv. p. 972. *DeCand. prodr.* i. p. 484.

H. minor, *Lam. dict.* iii. p. 229. *DeCand. prodr.* i. p. 484.

Loc. Nat. Littora Ind. Or. Insul. Molucc. Philipp. Javæ et Nov. Holl.

H. *attenuata*, foliis lanceolatis acuminatis.

Heritiera attenuata, *Wall. List*, n. 1140.

Loc. Nat. Ora Martabaniæ et Tenasserim, *Wallich.*

GENUS DUBIÆ TRIBUS.

MICRANDRA.

CHAR. GEN. *Masc.*—*Calyx* turbinatus 5-fidus patens æqualis æstivatione valvata. *Cor.* 0. *An-*

theræ 5 (6?) biloculares loc. parallelis duplici verticillo adnatæ medio columnæ filiformis ultra productæ indivisæ. *Fem.* ignota.

Arbor? floribus *paniculatis* foliis *ternatis foliolis petiolatis petiolis partialibus cum communi haud articulatis, nec apice teretibus v. incrassatis*, ideoque vix ad Sterculiaceas pertinens.

MICRANDRA *ternata.*

Loc. Nat. Brasilia? forsan Para? v. s. in Mus. Paris. ex Herb. Ulyssip.

Obs. Foliola elliptico-oblonga acuta, adulta super glaberrima nitida subtùs pube tenui simplici conspersa venis primariis parùm eminentibus costata.

ACTINOPHORA FRAGRANS, *Wallich.*

TAB. XLVI.

ACTINOPHORA, *Wallich.*

CHAR. GEN. *Calyx* 5-partitus; fructûs auctus, patens, foliaceus. *Petala* angusta, diù persistentia. *Stamina* indefinita, distincta. *Ovarium* 4-loculare; loculis biovulatis. *Stigmata* 4 (rarò 3 v. 5), indivisa. *Pericarpium* evalve, ruptile, monospermum. *Semen* erectum.

Arbor *parva* v. Frutex *subarborescens, multicaulis.* Folia *alterna, stipulata.* Inflorescentia *axillaris.*

ACTINOPHORA *fragrans*, Wallich, List, n. 1163.

DESCR.—*Arbor* v. *Frutex* multicaulis, 10—12-pedalis; caules partiales inordinatè ramosi, ramis ramulisque patulis parumque flexuosis, ultimis pube brevissimâ tomentosis. *Folia* simplicia, alterna, petiolata, stipulata, cuneato-oblonga, acutiuscula, 3—3½ uncias longa, 1½ unciam lata, coriacea, trinervia, nervis venisque primariis subtus elevatis, extra medium dentato-repanda, adulta super glabra subter pube stellari et tomento simplici flexuoso tecta: *petioli* breves. *Stipulæ* laterales, subulatæ, petiolo breviores. *Racemi* corymbosi, pauciflori, axillares, folio breviores. *Flores*, paulò ante expansionem visi, parvi. *Calyx* 5-partitus, æqualis, æstivatione valvatâ; laciniis coriaceis, ovatis, acutiusculis, planis, pube stellatâ utrinque tectis extùs copiosiore, post anthesin plurimùm auctis, trinerviis, reticulato-venosis, planis, subscarioso-membranaceis, pube rariore conspersis. *Petala* 5 foliolis calycis alternantia, mox ante expansionem calycis parva, lanceolata, basi parùm attenuata, post anthesin diù remanentia, elongata, subemarcida, lineari-lanceolata, basi valdè attenuata, filamenta emarcida superantia. *Stamina* numerosa, simplici serie hypogyna, æquidistantia, distincta. *Filamenta* subulata, glabra, omnia antherifera. *Antheræ* oblongæ, obtusæ, paulò supra basin emarginatam insertæ; connectivo angusto; loculis parallelis longitudinaliter dehiscentibus. *Pollen* subglobosum, hispidulum. *Ovarium* ovatum, sessile, pube stellatâ copiosâ, 4-loculare; loculis dispermis; ovulis erectis, collateralibus, cuneato-obovatis. *Stigmata* 3—4 (quandoque 5), indivisa, semiteretia, papillosa. *Pericarpium* evalve, pergameneo-crustaceum, subglobosum, calyce aucto patulo, filamentis emarcidis, et diù petalis elongatis sed calyce brevioribus

cinctum, ruptile, monospermum. *Semen* subsphæroideum, glabrum, irregulariter sulcis nonnullis longitudinalibus lobatum; umbilico nudo (nec strophiolato) prope basin lateris interioris.

Dr. Wallich, with whom the name *Actinophora fragrans* originates, and with whose specimens the plant here described and figured entirely agrees, has given no other account than that it was introduced into the Calcutta Botanic Garden in 1825, from the Isle of France. There is, however, no sufficient reason to believe that *Actinophora* is indigenous either in that island or in Bourbon or in Madagascar, whereas it is certainly a native of Java, Dr. Horsfield having found it in several districts, chiefly in the medial and eastern parts of the island, in teak forests in a rich soil, or in low ridges extending to the sea-shore. He adds that the wood, which is very hard and durable, is used for various domestic and mechanical purposes, and that it is so ponderous as to be occasionally employed for anchors of small native praoes and canoes. Its Javanese name is *Walli-kookoon.*

With respect to the affinities of *Actinophora*, it certainly does not belong to *Buttneriaceæ* as I originally defined it, but this may equally be said of several genera at present included in that order, and which like *Actinophora* are more obviously referable to *Tiliaceæ*; at the same time, as I observed in proposing the separation of *Buttneriaceæ*, these two families gradually pass into each other.

From all the genera of *Tiliaceæ* at present described, *Actinophora* is readily distinguishable; its more remarkable characters being the enlarged subfoliaceous spreading calyx, accompanying the crustaceous evalvular monospermous pericarpium.

R. Br.

Tab. XLVI. *Fig.* 1. A branch of *Actinophora fragrans*, of the natural size. *Fig.* 2. A flower just before expansion, with the calyx removed. *Fig.* 3. A stamen, magnified. *Fig.* 4. The ovarium, cut open longitudinally, crowned with the stigmata. *Fig.* 5. An ovule. *Fig.* 6. The fruit, with the enlarged persistent calyx, petals and stamina. *Fig.* 7. The enlarged calyx, seen from without. *Fig.* 8. The fruit, separated and slightly enlarged. *Fig.* 9. The same, cut open and with the seed removed. *Fig.* 10. The seed. *Fig.* 11. The convoluted cotyledons.

SARCOSTIGMA HORSFIELDII.

TAB. XLVII.

SARCOSTIGMA, *Wight and Arnott in Edin. New Philos. Journ.* xiv. p. 299 (1833).

CHAR. GEN. *Flores* unisexuales (dioici). *Perianthium* duplex; utrumque calycinum 5-fidum (raró 4-fidum); interius intra exterius sessile, æstivatione valvatâ. Masc. *Stamina* 5 (raró 4), tubo brevissimo perianthii inserta, ejusdem laciniis alternantia, exserta. *Antheræ* versatiles. Fem. *Ovarium* uniloculare, biovulatum; ovulis ab apice cavitatis pendulis. *Stigma* sessile, depresso-capitatum, indivisum. *Pericarpium* drupaceum, perianthio utroque, interiore indurato, subtensum. *Semen* . . . .

Frutices *volubiles, tenuè pubescentes, glabriusculi.* Folia *alterna, simplicia, integerrima, penninervia, reticulato-venosa, coriacea, petiolata, exstipulata.* Spicæ *e glomerulis alternis paucifloris indivisæ.*

SARCOSTIGMA *Horsfieldii*, foliis obovato-oblongis, spicarum rachibus perianthioque interiore extùs pubescentibus.

Loc. Nat. In provinciâ orientali Blambangan, ubi anno 1806 et in pago Pagetan anno 1809 detexit *D. Horsfield*. Javanis *Kamaras*.

DESCR.—Frutex volubilis, ramosissimus; caule tereti (diametro sæpè bipollicari (*D. Horsfield*). Folia alterna, petiolata, exstipulata, integerrima, coriacea, glabra, impunctata, penninervia, reticulato-venosa, obovato-oblonga, extra medium paulò latiora, quandoque acutiuscula, nunc obtusissima et emarginata, 5—6-pollicaria, ultra duos pollices lata. Petioli teretes, semunciales, juxta basin arcuatim recurvi. Spicæ longæ, sæpiùs 2—3 aggregatæ quandoque solitariæ, nunc rameæ absque cicatrice folii delapsi, nunc axillares, indivisæ sed e glomerulis alternis 3—4 floris formatæ; rachi tereti pedicellisque flosculorum, perianthio brevioribus, extùs pubescentibus. Flores parvi. Perianthium exterius abbreviatum, 5-lobum lobis rotundatis; interius æstivatione valvatâ altè 5-fidum; laciniis planis, lanceato-linearibus, acutis, intùs glabris, supra medium recurvis. Stamina 5:

filamenta laciniis perianthii interioris alternantia, ejusdem tubo inserta, filiformia, lacinias limbi æquantia v. superantia. Antheræ versatiles, ovales; loculis parallelis, approximatis, longitudinaliter dehiscentibus. Rudimentum pistilli parvum, pubescens. Fem. perianthiis, ut in Masc. interioris, laciniis apice recurvis. Ovarium ovatum, pubescens, uniloculare, biovulatum; ovulis collateralibus, ab apice cavitatis pendulis. Pericarpium drupaceum, oblongum, ipsâ basi perianthio interno indurato vix aucto subtensum; putamine crasso-pergameneo, rugoso (pulpâ succulentâ eduli (*D. Horsfield*). Semen . . . . . R. Br.

My remarks on the affinities of *Sarcostigma* are annexed to the account of the following genus, *Iodes*.

Tab. XLVII. *Fig.* 1. Flowering branch of a female plant of *Sarcostigma Horsfieldii*. *Fig.* 2. Part of a male spike; both of natural size. *Fig.* 3. A male flower, moderately magnified. *Fig.* 4. A male flower with quaternary division; probably a rare occurrence. *Fig.* 5. A stamen, to show the mode of dehiscence and insertion of filament. *Fig.* 6. The outer floral envelope or calyx. *Fig.* 7. A female flower, magnified in the same degree as the male; to show the expansion, recurvation and external pubescence of the segments of the inner perianthium or corolla. *Fig.* 8. An ovarium, slightly magnified and cut open to show the two pendulous ovula. *Fig.* 9. A drupe, nearly ripe, natural size.

IODES OVALIS, *Bl.*

TAB. XLVIII.

Iodes, *Blume, Bijdr.* p. 29.

Char. Gen. *Flores* unisexuales (dioici), 5-fidi. *Perianthium* duplex: utrumque calycinum; interius 5-partitum, majus, æstivatione valvatâ. Masc. *Stamina* 5, tubo abbreviato perianthii (corollæ?) inserta, ejusdem laciniis alternantia iisque breviora. *Antheræ* stantes. Fem. *Ovarium* uniloculare, biovulatum; ovulis ab apice cavitatis pendulis. *Stigma* sessile, depresso-capitatum, umbilicatum. *Drupa* exsucca, stigmate apiculata. *Semen* unicum: *Albumen* semini conforme; *Embryo* dimidio albumine longior; *Radicula* supera.

Frutex *volubilis, cirrhis axillaribus scandens*; foliis *oppositis, integerrimis, petiolatis, exstipulatis*; floribus *parvis, paniculatis, axillaribus*.

Iodes *ovalis*, Blume, Bijdr. p. 30 (1825); Hasskl. Hort. Bogor. p. 172. n. 798.

Loc. Nat. In plagis orientalibus, primùm 1806 et posteà in variis locis detexit *D. Horsfield.* Javanis *Jungetan* et *Jagal-Kedang*.

Descr.—Frutex (quandoque subarborescens, *D. Horsfield*) pubescens, scandens, cirrhis axillaribus indivisis nunc oppositifloris. Folia opposita, petiolata, exstipulata, coriacea, penninervia, reticulato-venosa, ovata, acuta, basi obtusa, 4—5 uncialia, ultra 2 pollices lata; petioli semunciales, teretiusculi. Paniculæ axillares, compositæ, corymbosæ. Flores parvi, pubescentes (odorati *D. Horsfield*). Masc. Stamina 5, perianthio interiori (corollâ potiùs) aliquoties breviora, ejusdem laciniis alternantia; filamentis brevissimis; antheris basifixis, loculis approximatis parallelis longitudinaliter dehiscentibus. Rudimentum pistilli. Fem. Floribus paulò post anthesin solùm visis, et tunc etiamque fructu maturo perianthio unico tantùm persistenti nec aucto nec indurato. Drupa exsucca, rugosa, magnitudine pisi majoris. Semen unicum maturescens; albumen carnosum, album, magnitudine seminis: Embryo respectu pericarpii inversus; Cotyledonibus subrotundis, planis, foliaceis; Radiculâ rectâ, brevissimâ, superâ.

Obs. I. Botanists are not agreed as to the light in which the two floral envelopes of *Sarcostigma* and *Iodes* are to be viewed. Both Klein, in describing the plant from which *Sarcostigma* was formed, and Blume, in his character of *Iodes*, have termed the outer envelope calyx and the inner corolla; while Drs. Wight and Arnott, by whom the genus *Sarcostigma* was established, have considered the outer envelope an involucrum and the inner calyx. In support of this opinion the persistence and even induration of the inner envelope in *Sarcostigma* would no doubt be adduced; but they were also, it may be supposed, determined by their referring their genus to *Hernandiaceæ*, there being in *Hernandia* an undoubted involucrum, but that involucrum containing several flowers. On the other hand, the alternation of division of the two envelopes, and their close approximation in both these genera, are characters of at least equal importance; to which may be added the many analogous points of structure between these genera and *Cardiopteris*, in which it will hardly be disputed that both calyx and corolla are present.

Obs. II. As to the affinities of *Sarcostigma* and *Iodes*, the former genus was referred by Wight and Arnott to *Hernandiaceæ*, a family proposed by Blume in his "Bijdragen," p. 550, and adopted by Endlicher, consisting of *Hernandia* and *Inocarpus*, two genera which do not appear to me very nearly related to each other, and from both of which *Sarcostigma* is readily distinguished by many important characters. In the following year Professor Arnott, in describing *Nansiatum* of Dr. Buchanan Hamilton, proposed to place it next in affinity to *Phytocrene* of Wallich (*Gynocephalum* of Blume), and to form of these two genera the new family of *Phytocreneæ*. It is remarkable that he did not also include in this family *Sarcostigma*, which so obviously belongs to it: this has been recently done by M. Planchon, who also justly proposes to add *Iodes*, appended by Blume to *Menispermeæ*, as well as *Miquelia* or *Jenkinsia*, which he regards as distinct genera, but which I think ought to be united. He also includes *Pyrenacantha*, properly united with *Adelanthus* of Endlicher; but this genus I exclude, admitting, however, its near relationship.

Of Phytocreneæ so constituted I subjoin the distinguishing characters of the family, as well as the differential characters of the genera belonging to it.

Phytocreneæ, *Arnott, in Edinb. New Phil. Journ.* xvi. p. 314 (1834).

Flores diclines (dioici), inconspicui. *Perianthium* duplex (*Calyx* et *Corolla*) utrumque 4—5-fidum, calycinum; interius majus, æstivatione valvatâ, intra exterius in quibusdam pedicellatum. Masc. *Stamina* 4—5, laciniis perianthii interioris alternantia; *filamenta* nunc hypogyna et ipsâ basi coalita, nunc tubo perianthii inserta; *Antheræ*: loculis longitudinaliter dehiscentibus. Rudimentum *pistilli*. Fem. *Ovarium* liberum, uniloculare, biovulatum; ovulis ab apice cavitatis suspensis. *Stigma* sessile, indivisum v. bifidum. *Drupa* monosperma. *Albumen* semini conforme; *Embryo* magnitudine fere albuminis, cotyledonibus foliaceis.

Frutices *volubiles v. scandentes*; foliis *alternis rarò oppositis, integerrimis v. lobatis, exstipulatis.*

Phytocrene, *Wallich, Pl. Asiat. rar.* vol. iii. p. 11. t. 216.

Flores utriusque sexûs 4-fidi, capitati. *Stamina* hypogyna. *Antheræ* versatiles. *Stigma* bilobum, obtusum.

Folia *indivisa v. lobata.*

Sarcostigma, *Wight & Arnott, in Edinb. New Phil. Journ.* xiv. p. 299.

Flores spicati, 5-fidi (rarò 4-fidi). *Stamina* tubo perianthii inserta, ejusdem laciniis longiora. *Antheræ* versatiles. *Stigma* depresso-capitatum. *Drupa* pulposa.

Frutices *volubiles*; foliis *alternis integerrimis.*

Iodes, *Blume.*

Flores 5-fidi, paniculati. *Stamina* tubo perianthii longioris inserta, ejusdem laciniis breviora. *Antheræ* stantes. *Stigma* depresso-capitatum. *Drupa* exsucca.

• Frutex *cirrhis axillaribus scandens*; foliis *oppositis, integerrimis.*

Nansiatum, *Buchanan Hamilton, in Edinb. New Phil. Journ.* xvi. p. 314.

Flores 5-fidi, spicati. *Stigmata* duo, acuta, recurva. *Pericarpium* . . . . .

Suffrutex *volubilis*; foliis *alternis, indivisis*

Miquelia, *Meisn. Gen.* 152. Jenkinsia, *Griffith, in Calc. Journ. Nat. Hist.* iv. p. 231. t. 12.

Flores 5-fidi. Masc. *Perianthium* interius intra exterius pedicellatum. Fem. *Perianthium* interius intra exterius sessile. *Stamina* sub ovarii rudimento inserta. *Stigma* depresso-capitatum, umbilicatum. *Drupa* exsucca.

Suffrutices *volubiles*; foliis *alternis, integerrimis*

Phytocreneis affine genus,

Pyrenacantha, *Hooker, Bot. Misc.* ii. p. 107, *Tabb.* Suppl. 9, 10,

Pyrenacantha *Adelantho* congener, a *Phytocreneis* diversum: *Perianthio* simplici; *Stigmate* radiatim multifido: quadrat *Staminibus* cum calycis segmentis alternantibus; *æstivatione* valvatâ; *Pericarpio* indehiscente. R. Br.

Tab. XLVIII. *Fig.* 1. A flowering male branch of *Iodes ovalis*. *Fig.* 2. The outer perianthium. *Fig.* 3. The deeply divided inner perianthium or corolla. *Fig.* 4. An anthera burst longitudinally, with insertion at base. *Fig.* 5. Rudiment of ovarium in male flower. *Fig.* 6. Ovarium after flowering, subtended by one only of the perianthia. *Fig.* 7. The same laid open, to show the number and insertion of ovula. *Fig.* 8. A ripe drupe, natural size. *Fig.* 9. The seed. *Fig.* 10. The seed cut open lengthways, to show the relative proportion of albumen and embryo. *Fig.* 11. The embryo inverted in respect to pericarpium.

CARDIOPTERIS LOBATA, *Wall. List*, n. 8033.

TAB. XLIX.

CARDIOPTERIS, *Wallich.*

CHAR. GEN. *Flores* hermaphroditi? (v. monoici). *Calyx* 5-partitus, æstivatione imbricatâ, persistens. *Corolla* monopetala, rotata, limbo æquali 5-fido, æstivatione imbricatâ, decidua. *Stamina* 5, tubo corollæ, sub sinubus limbi inserta. *Antheræ* longitudinaliter dehiscentes. *Ovarium* liberum, uniloculare, biovulatum; *ovulis* pendulis. *Stigmata* duo: altero (vero) post anthesin aucto, emarginato, tardè deciduo: altero (effœto) capitato, pedicellato, persistenti. *Samara* compressa, alata, monosperma. *Albumen* semini conforme. *Embryo* minutissimus, in apice (respectu pericarpii) albuminis.

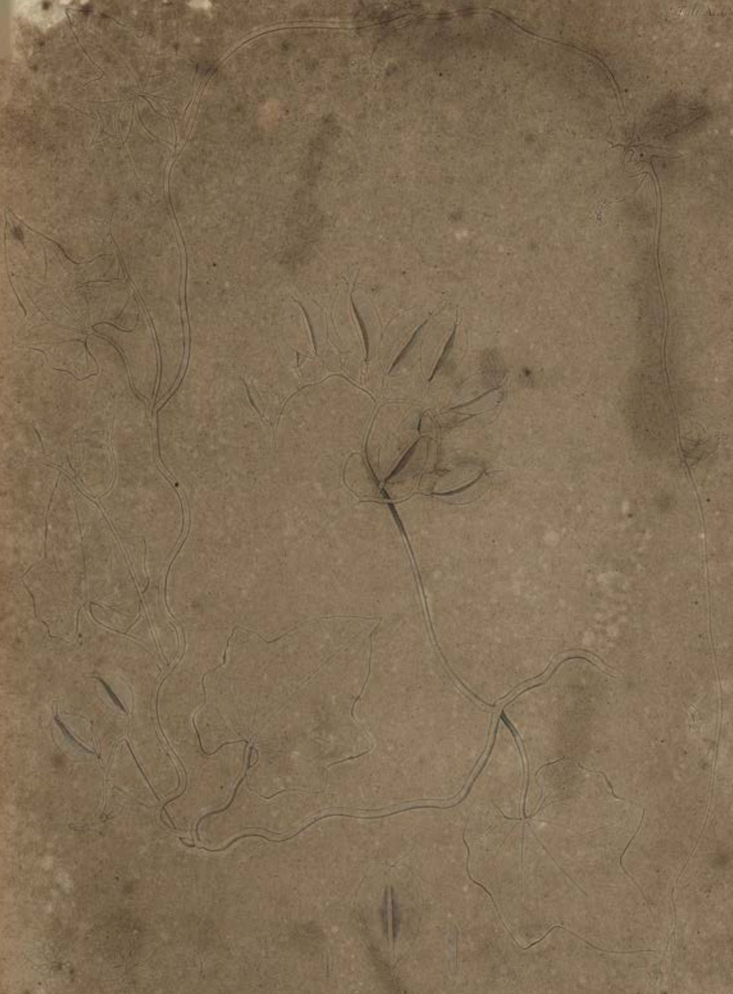
Plantæ *annuæ v. biennes, volubiles, glabræ,* lacte albo scatentes (fid. *D. D. Blume* et *Hasskarl*); Foliis *alternis, petiolatis, exstipulatis, v. lobatis v. integerrimis, cordatis, venosis*; Cymis *furcatis v. dichotomis v. paniculatis*; floribus *parvis, secundis, ebracteatis.*

CARDIOPTERIS *lobata* (Wall. List, n. 8033), foliis angulato-lobatis, cymis furcatis v. semel dichotomis.

Cardiopteris javanica, *Blume, Rumphia*, vol. iii. p. 206. tab. 177.
Peripterygium quinquelobum, *Hassk. Hort. Bogor.* p. 235.
An Dioscorea sativa? *Kœnig, MSS. in Mus. Brit.* vol. iii. p. 81, exclus. syn. *Rumph. Amb.* tom. v. p. 482, ad Cardiopteridem moluccanam, *Blume, Rumph.* vol. iii. p. 207 pertinente.

Loc. Nat. In plagis orientalibus et medianis Javæ; in planitiis haud multum elevatis supra mare anno 1806 primùm detexit *D. Horsfield.* Javanis orientalibus *Parianom*, medianis *Kanjar Kawang* vel *Rindengan* appellata.

DESCR.—Planta annua? volubilis, glaberrima, præter raches spicarum tenuissime pubescentes



pube acutâ simplici. Rami ramulique flexiles, striati, inanes. Folia alterna, remota, elongato-petiolata, exstipulata, flaccidè membranacea, angulato-lobata, altè cordata; lobo medio acuminato cum mucronulo brevi; reliquis obtusis, muticis; diametro 2—3 pollicari; basi nervis 5—7 lobis respondentibus, immersè reticulato-venosis. Cymæ axillares, pedunculatæ, semel v. bis furcatæ. Flores unilaterales, ebracteati, brevissimè pedicellati, parvi, caput aciculi mediocris vix superantes. Calyx 5-partitus, æqualis, membranaceus, texturâ subcorollinâ, æstivatione imbricatâ; sepalis ovatis, obtusiusculis, marginibus tenuissimè ciliatis, subenerviis, axi parùm opaciore. Corolla monopetala, calycem vix superans, subrotata, virescenti-alba, glaberrima; tubo perbrevi, limbo 5-partito æquali; laciniis obovatis, obtusis, concaviusculis, obsoletè immersè venosis, æstivatione imbricatis. Stamina 5, epipetala, æqualia, corollâ breviora, ejusdem sinubus inserta. Filamenta brevia, filiformia, glabra. Antheræ pro ratione flosculi majusculæ, didymæ, utrinque profundè emarginatæ; connectivo membranaceo angusto; loculis appositis, longitudinaliter dehiscentibus. Discus hypogynus nullus. Ovarium uniloculare, biovulatum; ovulis collateralibus, ab apice cavitatis pendulis, altero sæpè minore effœto. Stigmata duo; alterum (imperfectum) sub anthesi magis conspicuum, stylo manifesto insidens, capitatum, læve nec papillosum; alterum (perfectum) sub anthesi vix obvium, posteà sensim valdè auctum, demùm emarginatum, superficie interiore imperfectum spectante papillosum. Samara obcordata, nitida, vix uncialis, ipsâ basi angustatâ calyce persistenti vix aucto conniventi subtensa; alâ marginatâ utrinque ipso nucleo subcylindraceo ter quatervè latiore pergamenеâ; stigmate vero plurimùm aucto emarginato, tardè deciduo, stigmate effœto, capitato, pedicellato, persistenti, haud mutato, subemarcido, coronata. Semen unicum, testâ? cum samaræ cavitate cohærens et omninò replens, striatum, subcylindraceum; integumentum præterea unicum, membranaceum, albumini arctè adhærens. Albumen semini conforme, aqueo-pallidum, densè carnosum. Embryo in apice (respectu pericarpii) albuminis, minutissimus; radicula brevis, supera; cotyledon adhuedum indivisus, subglobosus, obtusissimus.

Obs. There are some points both in the botanical history and in the structure of the genus *Cardiopteris* which deserve to be specially noticed. It is probable that a short time before the publication of the 10th edition of his "Systema Naturæ" in 1759, Linnæus had particularly examined the figures of the "Herbarium Amboinense," for in that edition almost the only figures quoted of the different species of *Dioscorea* are those of that work, and under *Dioscorea sativa* he refers to *Olus sanguinis*, vol. v. p. 482, tab. 180, which is an undoubted and a tolerably good representation of *Cardiopteris moluccana* of Blume; and in proof of Linnæus having no doubt as to the correctness of his reference, he has in his own copy of the work written *Dioscorea sativa* under the figure quoted. This synonym is adopted by Willdenow in his edition of "Species Plantarum." J. G. Kœnig, in vol. iii. p. 81 of his manuscripts, formerly in Sir Joseph Banks's Library, now in the Banksian or Botanical Department of the British Museum, quotes the same figure of Rumphius (with a doubt however as to the correctness of Linnæus's reference to *Dioscorea*) for a plant which is no doubt *Cardiopteris lobata*, from his description in many respects very good, and with regard to stigma more nearly correct than some recent accounts. Kœnig considers his plant to be monoicous, as does Hasskarl (*supr. cit.*): I also entertained the same opinion, having never found flowers with completely developed pistillum in which the corolla and consequently stamina were present. This, however, might depend on the advanced state of the flower whose corolla had fallen soon after expansion. Dr. Blume therefore is perhaps more correct in considering the flowers as hermaphrodite, and I am inclined to adopt his view. His statements respecting the structure of the pistillum are more liable to objection: he describes the ovulum as orthotropous, having the micropyle at its lower extremity, and the embryo consequently existing at the same point of the seed; my own observations, which may indeed require to be verified, placing the embryo at the upper ex-

tremity, or close to the insertion of the seed, the ovulum being consequently anatropous. The external structure of the pistillum is very singular. In an early stage of the flower, immediately before or even at the time of expansion, there are apparently two stigmata: of these the more obvious is capitate, undivided, fleshy, but not papillose, and is supported on a distinct style; the second is quite sessile, much shorter in this stage than the capitate branch, and having its upper or inner surface distinctly stigmatic or papillose. In the next stage, the latter, which I regard as the efficient stigma, gradually enlarges, becoming longer than the capitate organ, which in my opinion is an imperfect stigma, and as in this stage the ovarium though enlarged has not perceptibly increased in diameter, this capitate stigma has the appearance of being lateral. The perfect stigma, which continues to lengthen, its upper surface becoming more evidently hispid or papillose, not unfrequently remains crowning the samara even when ripe, but frequently also it is then deciduous, while the imperfect capitate stigma, which has undergone no change either in size or surface, more generally remains after the real stigma has fallen.

In one of the flowers of a specimen preserved in spirits by Dr. Wallich, and in which the corolla was wanting, and a slight enlargement of ovarium had taken place, I found only one ovulum, the lower extremity of which seemed in some degree to support Dr. Blume's account of the position of micropyle. In a second flower of the same specimen only one apparently perfect ovulum existed, but the funiculus or remains of a second was visible; in the perfect ovulum a more transparent point, which might possibly be micropyle, was lateral; and in a third flower, long after fœcundation, the samara being distinctly formed though not of its full size, I was able to observe only one ovulum, suspended from a funiculus which was continued on one side into a raphe ending at the lower and wider extremity of the ovulum. These appearances leave the question of the original position of micropyle undetermined.

Dr. Blume considers the capitate body as the true stigma, and I have some reason to believe that this is also the opinion of an excellent and more recent observer. I have little doubt, however, that the emarginate or bidentate branch is the organ performing the function. In connection with and in support of this opinion, I regard the ovarium or pericarpium of *Cardiopteris* as composed of two carpella, the line of junction being in the axis of the samara. This I infer from the relative position of the supposed perfect and imperfect stigmata, the former presenting its papillose surface to the latter, and both being in the plane of the wings of the samara; and these wings, as well as I can judge, being anterior and posterior with relation to the axis of the unilateral spike.

With respect to the affinities of *Cardiopteris*, Dr. Wallich, with whom the genus originated, and who first hazarded a conjecture on the subject, was disposed to refer it to *Sapindaceæ*; Hasskarl (l. supra cit.) has placed it among *Euphorbiaceæ*; and Blume, who considers it as forming a separate family (*Cardiopterideæ*), has placed this family in proximity with *Verbenaceæ* and *Boragineæ*. None of these approximations appear to me satisfactory, and although I am aware of several important objections to the view, I am inclined to consider *Cardiopteris* as an isolated genus or family to be placed at no great distance from *Phytocreneæ*, chiefly through *Iodes*, under which genus I have given some account of that family.

R. Br.

Tab. XLIX. *Fig.* 1. A branch of *Cardiopteris lobata*, in flower and fruit, natural size. *Fig.* 2. An expanded flower, slightly magnified, which shows the relative proportion of calyx, corolla and stamina, and the external appearance of pistillum, of which the capitate stigma has nearly attained its full size, while the true stigma is as yet barely visible. *Fig.* 3. A corolla laid open, to show that it is monopetalous, that the stamina are inserted below the sinuses, and that its segments are slightly ciliated, somewhat more magnified than figure 2. *Fig.* 4. The corolla removed, to show more distinctly the external structure of pistillum. *Fig.* 5. A stamen. *Fig.* 6. The calyx surrounding the somewhat enlarged pistillum, on which, from the elongation of the true emarginate stigma, the capitate or spurious stigma has become apparently lateral. *Fig.* 7. A ripe seed-vessel, natural size, with its short pedicle covered by the withered calyx, and crowned by the two stigmata, of which the true or emarginate has greatly increased in size, especially length, while the capitate, not at all enlarged, is barely visible. *Fig.* 8. A seed slightly magnified. *Fig.* 9. The embryo separate, magnified more than fig. 8, and so placed as to indicate that it must have been situated at the upper extremity of the seed.

BENNETTIA JAVANICA.

TAB. L.

BENNETTIA.

CHAR. GEN. *Flores* unisexuales (dioici), regulares, 5-fidi (minimi). *Calyx* 5-partitus. *Petala* 5 concava, æstivatione marginibus inflexis mutuò applicitis valvata. Masc. *Stamina* 10, petalis sæpiùs cucullatis inclusa. *Antheræ* loculis longitudinaliter dehiscentibus. Fem. *Ovarium* uniloculare, biovulatum, ovulis pendulis. *Stigmata* 3—4, filiformia, uno alterove quandoque bipartito. *Drupa* latior quam longa, monosperma. *Semen* figurâ drupæ. *Albumen* magnitudine seminis. *Embryo* transversus, rectus, longitudine fere albuminis; radicula alteri margini approximata, recta, cotyledonibus foliaceis.

Arbusculæ; foliis *simplicibus, alternis, integerrimis*, stipulis *lateralibus, sæpiùs caducis*. Spicæ *ramulos graciles terminantes, solitariæ, longissimæ, pendulæ*.

BENNETTIA *javanica*, masculi floris petalis altè cucullatis glabris: alabastro ultra medium 5-fido depresso lobis retusis, antheris rudimentoque pistilli imberbibus, drupis paulo tantum latioribus quam longis, foliis utrinque ramulisque glabris.

Loc. Nat. In plagis Javæ orientalibus, ubi primum detexit anno 1806 *D. Horsfield*; et anno 1814 regionibus medianis Insulæ observavit. Javanis orientalibus *Klimo Koncher*; medianis *Jirikan* appellata.

DESCR. *Arbuscula* glabra, ramosissima, ramulis virgatis. *Folia* alterna, integerrima, stipulata, brevè petiolata, impunctata, oblonga, super glabra, subter secundum nervum et venas saltem primarias tenuissimè pubescentia. *Stipulæ* laterales, angusto-subulatæ, petiolo paulo breviores, caducæ. *Spica* terminalis, solitaria, longissima (usque pedalis), indivisa, nutans; *mascula* e fasciculis 4—5-floris approximato-alternis, sessilibus, pedicellis unifloris basi unibracteatis superne ebracteatis; *feminea* floribus solitariis. *Flores masculi* parvi, caput aciculi mediocris subæquantes.

Calyx 5-partitus, æqualis, patens, laciniis planis acutiusculis pubescentibus, pube brevissimâ simplici acutâ. *Petala* 5, cum laciniis calycis alternantia, patentia, altè cucullata, obovata, glabra, apice cuculli retuso, calyce plus duplò longiora, brevissimè unguiculata, axi laminæ intùs incrassatâ prominulâ, æstivatione marginibus inflexis mutuò applicitis valvatâ, alabastro depresso 5-lobo. *Stamina* decem distincta. Filamenta brevissima, latiuscula, sepalis et petalis opposita. *Antheræ* biloculares, loculis connectivo lato distinctis longitudinaliter dehiscentibus; omnes cucullis petalorum semi-inclusæ, ita ut duæ petalo singulo oppositæ esse videantur (exterior interiorque), sed dum exterior ad filamentum petalo oppositum pertinet, interior e loculis respondentibus filamentorum duorum petalis alternantium formata est. *Pollen* simplex, sphæroideum. *Rudimentum pistilli* subovatum, apice depresso indiviso. *Feminei flores* paulo post fecundationem solum visi; petalis concavis haud cucullatis. *Ovarium* sphæroideum, 4—5-sulcum, pubescens, basi calyce parvo subtensum, stigmate triplici vel duplici singulo bifido v. laciniato coronatum, uniloculare, biovulatum, ovulis apici cavitatis affixis, collateralibus, latioribus quam longis, transversim oblongis, utroque angulo acutiusculo. *Drupa* paulò nec duplò longior quam lata, tenuissimè pubescens, pulpâ parcâ; putamine intùs venoso, basi excavato, depressione latâ longitudine totius baseos in cujus centro calyx persistens haud auctus. *Semen* unicum, apici cavitatis affixum, transversim ovale: integumento (testâ ?) simplici. *Albumen* semini conforme, carnosum. *Embryo* transversus, longitudine ferè albuminis. *Cotyledones* foliaceæ, quoad apicem cavitatis accumbentes, ovales. *Radicula* recta cotyledonibus multoties brevior, margini alteri approximata.

Obs. *Bennettia* is dedicated to the principal author of the present work, John Joseph Bennett, Esq., my friend and colleague in the British Museum.

The generic characters of *Bennettia* are clear and important, but the affinities of the genus, or its place in a natural arrangement, though determinable, are not equally obvious. Many important points of agreement will readily present themselves between *Euphorbiaceæ* and *Bennettia*, but the general resemblance it bears to *Antidesmeæ* is still more striking. In their simple entire alternate leaves with lateral deciduous stipules and in their inconspicuous unisexual flowers they entirely agree, very nearly also in inflorescence, in the structure of ovarium, in their monospermous drupaceous pericarpium, and lastly, in the presence and texture of albumen, and in the degree of development of embryo. The principal distinctions would therefore be reduced to the existence of petals in *Bennettia*, to its stamina being equal in number to the divisions or parts of both floral envelopes, to a remarkable and obvious difference in the structure and æstivation of antheræ, and to the singular character of its transverse embryo. The presence of petals may even be regarded as of more than ordinary importance, their usual form in the male flower being necessarily connected with the æstivation of stamina. According to this view, therefore, *Bennettia* may be said to bear the same relation to *Antidesma* (for *Antidesmeæ* contains at present no other well-established genus) that the polypetalous bear to the apetalous genera of *Euphorbiaceæ*. But according to a principle which I proposed for adoption in 1810, *Bennettia* ought not only to determine the place, but also give the name (*Bennettiaceæ*) to the family. The principle referred to is stated in the "Prodromus Floræ Novæ-Hollandiæ," p. 351, in a note relative to *Combretaceæ*, (an order then first proposed and characterized) in the following terms:—"Hunc ordinem inter polypetalos posui, non solum propter petalorum in pluribus existentiam, sed quia vera natura partium affinitatesque ordinum, ex contemplatione generum in quibus structura magis evoluta quam ex iis in quibus aliqua pars suppressa, tutius erui queant." In 1814, in conformity with the same principle, I placed among polypetalæ *Euphorbiaceæ*, a family to which the same reasoning is still more strikingly applicable. It is not my intention, however, to propose any change in this respect, for in both cases the names must be considered as established.

The affinity between *Euphorbiaceæ* and *Antidesmeæ* is rendered more obvious by the addition to the latter of *Bennettia*. But the structure of ovarium and the monospermous drupaceous pericarpium readily distinguish them.

Iodes and *Sarcostigma* also agree with *Bennettia* in several important points, particularly in their unisexual minute flowers, ovarium with two pendulous ovula, monospermous drupa, and in most respects in the structure of seed. They differ in habit, being twining or scandent shrubs without stipules, in their monopetalous persistent inner perianthium or corolla, in æstivation and reduced number of stamina, in structure of antheræ, and in the embryo being inverted, not transverse.

Obs. II. Several species of *Bennettia* have been discovered in India. One of these, first observed by the late Dr. Jack, at Singapore, was referred by him, though doubtfully, to *Limonia*. Dr. Blume, who had observed a plant of the same genus in Java, for which he adopted the generic name here proposed, having liberally communicated specimens and drawings of this plant, it proves to be identical with *Bennettia javanica*; and lastly, Dr. Wallich has, in the concluding distribution of his great Indian Herbarium, noticed several plants of the same genus, to which he has also given the name *Bennettia*. These plants so closely resemble *Bennettia javanica* and each other, that they are chiefly distinguishable by minute, but, as I believe, constant differences in their male flowers, and in the form of their fruits. Of these supposed species the differential characters are here subjoined.

Bennettia *Wallichii*, masculi floris petalis concavis vix cucullatis glabris, antheris rudimentoque pistilli imberbibus, drupis transversim oblongis duplò latioribus quam longis varicosis, ramulis foliisque utrinque glaberrimis.

Loc. Nat. India Or. Tavoy. *Wall., List*, 8585 E.

B. *phlebocarpa*, drupis latè cordatis sinu clauso reticulato-venosis paulo latioribus quam longis, foliis oblongis subacuminatis utrinque glabris.

Loc. Nat. Singapore. *Wall. List*, 8585 D.

B. *Finlaysoni*, masc. petalis modicè cucullatis glabris apice deflexo acuto: axi intùs elevatâ, antheris imberbibus, rudimento pistilli apice barbato, foliis oblongis acuminatis basi inæquilaterali subtùs nervo venis primariis ramulisque pubescentibus, spicis masc. foliis longioribus.

Loc. Nat. Pulo-Penang, b. Finlayson. *Wall. List*, 8585 B.

B. *affinis*, masc. petalis cucullatis glabris : axi intùs elevatâ, antheris imberbibus, rudimento pistilli apice barbato, stipulis ramulis venisque primariis subtùs pubescentibus, spicis folia lanceolato-oblonga acuminata subsessilia vix superantibus.

Loc. Nat. Pulo-Penang, b. Finlayson. *Wall. List*, 8585 B.

B. *pedicellata*, masc. petalis modicè concavis obtusis: axi intùs parum elevatâ, antheris filamentisque barbatis.

Obs. Sequenti nimis forsan affinis.

Loc. Nat. Pulo-Penang. *Wall. List*, 8585 C.

B. *Jackiana*, masc. petalis orbiculato-ovatis concaviusculis: axi intus haud elevatâ, antheris barbatis.

Loc. Nat. Pulo-Penang b. Jack. qui ad *Limoniam* dubitanter retulit. *Wall. List*, 8585 A.

R. Br.

Tab. L. *Fig.* 1. A flowering branch of the male plant of *Bennettia javanica*, natural size. *Fig.* 2. An expanded male flower, slightly magnified. *Fig.* 3. A male flower before expansion. *Fig.* 4. A petal of the same flower, somewhat magnified. *Fig.* 5. Back view of one of the longer stamina, but in which the loculi are too divergent. *Fig.* 6. A front view of one of the shorter stamina. *Fig.* 7. A male flower, the petals and stamina removed, to show the calyx and rudiment of pistillum. *Fig.* 8. A drupe, slightly reduced. *Fig.* 9. The same, longitudinally divided, which shows the single seed. *Fig.* 10. A seed, longitudinally divided to show its insertion, with the direction of the embryo and the relative proportion of its radicle and cotyledons

INDEX OF GENERA AND SPECIES.

INDEX OF NATIVE NAMES.

SUMMARY OF THE HERBARIUM.

The nu[illegible] in Dr. Horsfield's Herbarium is distributed among the larger divisions of the Vegetable Kingdom (distinguishing the principal Families) nearly in the following proportions:

CRYPTOGAMÆ		289
Lichenes	31	
Musci	60	
Filices	153	
Other Families	45	
MONOCOTYLEDONES		355
Gramineæ	116	
Cyperaceæ	62	
Orchideæ	75	
Scitamineæ	17	
Aroideæ	22	
Other Families	63	
DICOTYLEDONES.		
GYMNOSPERMÆ		5
APETALÆ		195
Urticeæ	85	
Piperaceæ	19	
Polygoneæ	16	
Amaranthaceæ	15	
Other Families	60	
MONOPETALÆ		587
Labiatæ	47	
Verbenaceæ	31	
Acanthaceæ	71	
Scrophularinæ	36	
Convolvulaceæ	28	
Cyrtandreæ	22	
Asclepiadeæ	23	
Apocyneæ	31	
Myrsineæ	20	
Compositæ	72	
Rubiaceæ	100	
Other Families	106	
POLYPETALÆ PERIGYNÆ		471
Cucurbitaceæ	30	
Myrtaceæ	25	
Leguminosæ	178	
Euphorbiaceæ	78	
Other Families	160	
POLYPETALÆ HYPOGYNÆ		294
Ampelideæ	19	
Meliaceæ	18	
Sapindaceæ	19	
Aurantiaceæ	12	
Ternstrœmiaceæ	15	
Elæocarpeæ	10	
Malvaceæ	71	
Capparideæ	15	
Annonaceæ	18	
Other Families	97	
Total		2196